

A review of the ferns and fern allies of the Northern Territory

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ABSTRACT

An account of the 47 genera and 88 formally named species of ferns and fern allies found in the Northern Territory, Australia, is presented. This figure includes records of nine species that were not included in *Flora of Australia* (McCarthy 1998). In addition, the presence of another five entities, whose identity and status is yet to be ascertained, occur in the Northern Territory. Distribution maps and illustrations are provided for most species.

KEYWORDS: Lycopodiophyta, Polypodiophyta, Psilophyta, ferns, fern allies, Northern Territory, Australia.

INTRODUCTION

Robert Brown (1810) was the first to collect ferns from localities now included within the boundaries of the Northern Territory (N.T.), naming and describing several species which are still recognised today. After Brown, knowledge of the ferns of the N.T. slowly increased during the nineteenth century through, for example, the efforts of Melbourne-based botanist Ferdinand Mueller and collectors with whom he was in contact. Mueller himself collected the type material of *Cheilanthes fragillima* from the Fitzmaurice River during the North Australian Expedition (1855–1856), and he described *Paraceterach reynoldsii* from a specimen collected near the Olgas by the explorer W.C. Gosse. Plant specimens collected in the late 1860s and early 1870s by Frederick Schultz in the Darwin region were sent to Kew for examination, with one of them becoming the type specimen of *Cheilanthes contigna*. Despite such activities Ewart and Davies (1917) could list just 36 species of ferns and fern allies for northern Australia.

The establishment of permanent herbaria within the N.T., in Alice Springs in 1954 and Darwin in 1966, with the associated staffing by professional botanists, plus visits by interstate botanists, led to a significant increase in the knowledge of the plants of the N.T. in the latter half of last century. Chippendale (1972) could list 59 species (some unnamed) and, just 15 years later, Dunlop (1987) listed 74 species of ferns and fern allies for the region. In the recent treatment of this group for the *Flora of Australia* series, 87 species were recognised (McCarthy 1998).

Curatorial work since the advent of the *Flora of Australia*, plus the receipt of new collections, has revealed the presence of 13 additional species or possible species in the Northern Territory. They are dispersed among the genera *Actinostachys*, *Adiantum*, *Asplenium*, *Bolbitis*, *Doodia*, *Gleichenia*, *Marsilea*, *Macrothelypteris*, *Microlepia* and *Pteris*. Nine of them are here referred, albeit sometimes tentatively, to known species but non-formal names are used for five others, i.e. *Asplenium* (Litchfield entity), *Asplenium* (Nabarlek entity), *Gleichenia* (Victoria River entity), *Marsilea* (Neutral Junction entity) and *Selaginella* (Mt Gilruth entity). These taxa are not described as new as species circumscription is uncertain, more material is required to establish their status or because names may already exist, the latter being something that cannot be ascertained without the examination of non-Australian specimens.

This review has been written not just to record the presence of new taxa but to emphasise areas requiring further research and to encourage others to observe and collect the ferns and fern allies of the N.T. To that end, some emphasis is placed on providing notes on species and infraspecific taxa that seem to be ill-defined and illustrations of almost all species are provided to assist in identification.

It is difficult if not impossible to make taxonomic changes without looking at variation in taxa throughout their range. Thus, although noting problems with circumscription, most species concepts adopted in this review are those used in various treatments in the *Flora of Australia* (McCarthy 1998). However, there are several areas where some taxonomic changes have been

suggested. In both *Marsilea* and *Nephrolepis* broader specific concepts than those used in treatments of the *Flora of Australia* have been adopted and subspecies of *Lindsaea ensifolia* have not been recognised.

With the adoption of the above taxonomy the Northern Territory contains 47 genera of ferns and fern allies and 88 formally named species that are native or believed to be naturalized, plus five informally-named entities of uncertain status. With the taxonomic changes here adopted, comparisons are not exact but Tindale (1998) recorded 456 species and 112 genera for Australia, with north-east Queensland (104 genera, 302 species) having easily the greatest diversity of these plants.

From data provided by Tindale (1998) of the species recognised within Australia, 166 (ca 36%) are endemic. However, of the formally named species and infraspecific taxa here recognised for the N.T. only 25 are confined to Australia and only *Isoetes cristata* and *Marsilea latzii* are seemingly confined to the N.T. Most species which occur here are in fact widespread in the Old World tropics and perhaps 13 are pantropical or almost so. The latter group includes the only two weedy ferns within the N.T., *Salvinia molesta* and *Pityrogramma calomelanos*, both being native to the Americas and pantropical by introduction.

MATERIALS AND METHODS

The abbreviation DNA is the accepted abbreviation for the Northern Territory Herbarium. This and other herbarium abbreviations used are summarised in Holmgren *et al.* (1990).

Text abbreviations of the titles of scientific journals follow Lawrence *et al.* (1968) and titles of books are abbreviated following Stafleu and Cowan (1976–1988). Names of authors are abbreviated following Brummitt and Powell (1992).

Many original publications have been consulted but very few type specimens have been examined during the compilation of the review. Thus, in providing details of literature, and particularly of type specimens, considerable reliance has been placed on data gleaned from Chapman (1979) and various treatments, all referenced, in the *Flora of Australia* (McCarthy 1998). Specimens in the Hermann Herbarium have been checked on the Natural History Museum (BM) website.

Family concepts are those used in *Flora of Australia*; full reference to them are given under each family treatment.

For every species and infraspecific taxon the time when fertile plants may be found is indicated. This information is based on data associated with herbarium specimens.

SYSTEMATICS

Key to families of ferns and fern allies

- 1a. Sporangia in the axils of minute, forked leaves (or leaf-like organs) *or* at the base of small leaves (sporophylls) held in cone-like structures *or* in swollen leaf bases 2
- 1b. Sporangia on the lamina of leaves (fronds) *or* aggregated into a spike *or* enclosed in a hard, nut-like sporocarp 5 (Polypodiophyta)(p.16)
- 2a. Leaves scale-like and scattered on rigid stems; sporangia fused in groups of 2 or 3 and held in the axis of the leaves Psilotophyta (Psilotaceae)(p.11)
- 2b. Leaves linear and grass-like and sporangia at their bases *or* the leaves small but numerous on weak to erect stems and the sporangia held in cone-like structures.. 3 (Lycopodiophyta)(p.11)
- 3a. Leaves linear and grass-like Isoetaceae (p.11)
- 3b. Leaves small but numerous on weak to erect stems; sporangia in the axis of sporophylls which are aggregated to form cone-like structures..... 4
- 4a. Sporangia of only one kind; leaf bases lacking a ligule Lycopodiaceae (p.13)
- 4b. Sporangia of two size classes; leaf bases with a minute ligule (but often difficult to see in adult plants)..... Selaginellaceae (p.15)
- 5a. Fronds of 2 pairs of opposite, closely spaced leaflets at the end of a long stipe, the whole having the appearance of a 4-leaved clover Marsileaceae (p.24)
- 5b. Fronds not comprised of apical leaflets 6
- 6a. Sporangia aggregated in a spike; sterile lamina and fertile spike diverging from a common stalk Ophioglossaceae (p.16)
- 6b. Sporangia not aggregated in a spike; sterile and fertile fronds borne separately or all fronds fertile 7

7a.	Free-floating plants, the sterile laminae simple and paired <i>or</i> crowded and less than <i>ca</i> 2 mm long	8
7b.	Terrestrial, lithophytic or epiphytic plants <i>or</i> if free-floating the sterile lamina 1–3-pinnate	9
8a.	Fronds monomorphic, of many, crowded, bilobed leaves, each less than <i>c.</i> 2 mm long	Azollaceae (p.30)
8b.	Fronds dimorphic, with root-like leaves and foliar leaves more than 8 mm long	Salviniaceae (p.29)
9a.	Sori submarginal, each composed of a ring or double row of free sporangia; fern with a short trunk and with fronds to 4 m long, margins of pinnac toothed	Marattiaceae (p.19)
9b.	Sori not submarginal or if so sporangia not in a double row or ring; fern lacking a trunk or if present then margins of pinnae entire	10
10a.	Sori on narrow segments arranged like a cock's comb and borne on the apices of fertile fronds <i>or</i> on marginal projections of fertile fronds	11
10b.	Sori not arranged as above	12
11a.	Sori on narrow segments borne on the apices of fertile fronds	Schizaeaceae (p.30)
11b.	Sori borne on marginal segments of fertile fronds	Lygodiaceae (p.32)
12a.	Aquatic or semi-aquatic, usually rooted fern with strongly dimorphic fronds	Parkeriaceae (p.55)
12b.	Terrestrial or epiphytic fern	13
13a.	Lamina translucent, the ultimate segments 1-cell thick apart from the veins	Hymenophyllaceae (p.19)
13b.	Lamina not translucent nor 1-cell thick	14
14a.	Fronds pseudodichotomously branched, with buds in the axils of the branches	Gleicheniaceae (p.21)
14b.	Fronds unbranched or if branched then not appearing to be dichotomous and buds never present in the axils	15
15a.	Fronds dimorphic, the lamina simple or 1-pinnate and the sessile or near-sessile pinnules pouch-like and less than 2.5 mm long	Platyzomataceae (p.24)
15b.	Fronds monomorphic or dimorphic, if dimorphic the pinnules never small and pouch-like	16
16a.	Fronds simple, with the lamina linear, 5–50 cm long, 0.25–0.6 cm wide, ultimately pendulous	Vittariaceae (p.57)
16b.	Fronds divided or if simple then not linear and pendulous	17
17a.	Sporangia mostly or only borne away from the margins of the pinnae/pinnules or covering all or most of the surface; indusium if present never half-cup-shaped	18
17b.	Sporangia confined to marginal or submarginal regions and often covered by the reflexed margins of the pinnae/pinnules; indusium absent or present and may be half-cup-shaped	29
18a.	Sporangia covering the undersurface of fertile pinna <i>or</i> covering all but the narrow margins of the undersurface and the pinnac linear	19
18b.	Sporangia not covering the entire surface but in discrete regions	21
19a.	Fertile pinnae linear, less than 5 mm wide; sterile pinnae shiny, their veins numerous, close and parallel	Blechnaceae (p.62)
19b.	Fertile pinnae lanceolate or if somewhat linear then 10 mm or more wide; sterile pinnae with reticulate venation	20
20a.	Pinnae margins entire	Pteridaceae (p.39)
20b.	Pinnac margins shallowly to deeply lobed	Lomariopsidaceae (p.66)
21a.	Sori circular or subreniform (but in very mature sori the sporangia may link to form an elongate grouping)	22
21b.	Sori elongate	25

- 22a. Fronds simple or 1-pinnatifid or sometimes 1-pinnate, margins of the lobes or pinnae entire or if at all toothed or minutely lobed then irregularly so and lobes or pinnae with entire margins also present on the same or different fronds 23
- 22b. Fertile fronds 1- or 2-pinnate or 3-pinnatifid, pinnae always regularly toothed or lobed for all or much of their length 24
- 23a. Sterile fronds 1-pinnate, with 1–3 pairs of pinnae Dryopteridaceae (p.66)
- 23b. Sterile fronds oak-leaf shaped *or* simple or 1-pinnatifid and with (3) 10–30 lobes Polypodiaceae (p.69)
- 24a. Hydathodes prominent on the upper surface of the lamina at the ends of veins Davalliaceae (p.67)
- 24b. Hydathodes absent from the upper surface of the lamina, the veins more or less extending to the lamina margin Thelypteridaceae (p.58)
- 25a. Indusium present 26
- 25b. Indusium absent 28
- 26a. Sori formed on either side of, and touching, the costa and sometimes running unbroken for much of its length Blechnaceae (p.62)
- 26b. Sori not as above 27
- 27a. Fronds monomorphic; lamina with latticed, branching scales Aspleniaceae (p.57)
- 27b. Fronds dimorphic; lamina with uniseriate hairs Blechnaceae (p.62)
- 28a. Lamina glabrous or their lower surface with a white waxy coating Adiantaceae (p.42)
- 28b. Lamina surfaces with a dense indumentum of eglandular and/or glandular hairs Aspleniaceae (p.57)
- 29a. True indusia present (may be poorly developed and if so then pinnules leathery, narrow, with recurved margins and their undersurfaces densely hairy) 30
- 29b. True indusia absent but margins of lamina may form a false indusium or soral flap (if pinnules leathery, narrow and with recurved margins with membranous, indusium-like margins then their undersurfaces glabrous) 33
- 30a. Indusia half-cup-shaped Dennstaedtiaceae (p.34)
- 30b. Indusia elongate to continuous 31
- 31a. Pinnules leathery, their margins recurved and their undersurfaces densely hairy Dennstaedtiaceae (p.34)
- 31b. Pinnules not as above 32
- 32a. Pinnae jointed to the rachis; ultimate segments with a distinct midvein; fronds 1-pinnate Davalliaceae (p.67)
- 32b. Pinnae not jointed to the rachis; ultimate segments with or without a distinct midvein; fronds 1- or partly 2-pinnate Lindsaeaceae (p.36)
- 33a. Fronds with the lamina thin and glabrous; pinnae sessile, with stipule-like pinnules at the base Dennstaedtiaceae (p.34)
- 33b. Fronds not with the above combination of features 34
- 34a. Ferns robust, their fronds commonly 1 m or more tall, the pinnae thick, with inrolled margins and glabrous or almost so Pteridaceae (p.39)
- 34b. Ferns mostly weak, their fronds mostly less than 50 cm tall, if pinnae thick then with scales or densely hairy on at least one surface Adiantaceae (p.42)

Division Psilotophyta

Cosmopolitan, containing a single family.

Psilotaceae

Two genera, *Psilotum* and *Tmesipteris*, and both in Australia but only the former in the N.T.

Reference: Chinnock (1998a).

Psilotum Sw.

Plants lacking true roots but with a dichotomously branched rhizome bearing rhizoidal hairs. Stems photosynthetic, erect or drooping, dichotomously branched. Leaves scale-like and lacking a vascular nerve, leaves undivided or bifid. Sporangia in trilobular synangia in axils of bifid leaves. Spores numerous, bilateral, monolete.

Ditypic, widespread genus, with both species in Australia but only *P. nudum* in the N.T.

Psilotum nudum (L.) P. Beauv.

(Fig. 1A–C)

Skeleton fork fern

Lycopodium nudum L., Sp. pl. 2: 1100 (1753).

Psilotum nudum (L.) P. Beauv., Prodr. aethéogam. 112 (1805).

Type: 'in Indiis'; syn.: LINN 1257.1.

Plants epiphytic or terrestrial. Rhizome creeping, branched, often clumped. Stems 10–65 cm long; branches subterete, subterete, the largest ca 3 mm diam., with 3–7 ribs; stomata restricted to the furrows between the ribs; scale-like leaves 1–2.5 mm long, yellowish, restricted to the ribs. Synangia 1.5–2.5 mm diam., sessile, yellow. Fertile plants: generally throughout the year.

Distribution. Widespread in the tropics and subtropics of the world and sometimes extending to temperate regions and, in areas of permanent water, arid regions (Australia: W.A., N.T., Qld, N.S.W., Vic.) (p.77).

Habitat. Common in monsoonal rainforest, where it may be epiphytic, and in permanent seepage areas in the Top End. Also found in seepage areas, e.g. Twin Gorge (Dulcie Ranges) and waterholes, e.g. Reedy Rockhole (George Gill Range), in southern parts of the N.T.

Division Lycopodiophyta

Cosmopolitan and containing three families, all of which occur in Australia.

Isoetaceae

A family containing perhaps two genera, *Isoetes* and *Stylites*, with only the former in Australia.

References: Andrews (1990), Chinnock (1998b).

Isoetes L.

Quillworts

Perennial or annual, grass-like plants, the corm 2–5-lobed, the roots arising from between the lobes, roots

forked towards the tips. Leaves mostly sporophyllous, spirally arranged, erect, filiform or linear but with dilated bases, 1-veined. Sporangia naked or partly or wholly covered by a velum, spores released by decay of sporangial walls. Megasporengia borne on outer leaves; megaspores ca 0.3–0.5 mm in diam., white or grey, ornamented. Microsporengia borne on inner leaves; microspores minute.

A widespread genus of ca 100 species, with 15 recognised in Australia and three in the N.T.

References: Marsden (1976a, 1976b), Chinnock (1998).

Megasporengia contain almost spherical, nucleate and mostly fertile megaspores and also enucleate, infertile megaspores. The latter are variably flattened and triangular in outline. Dumb-bell shaped megaspores may also occur but are not described in the following descriptions. The distal face is the large, half-spheroid part of the spore: the proximal faces are the three, somewhat triangular faces.

Key to species of *Isoetes*

- 1a. Fertile megaspores with manifestly different ornamentation on distal and proximal faces *I. cristata*
- 1b. Fertile megaspores with similar type of ornamentation on all faces 2
- 2a. Fertile megaspore with numerous large tubercles *I. coromandelina*
- 2b. Fertile megaspore with obvious ridges which are often confluent, occasionally with short ridges and small tubercle-like ornamentation *I. muelleri*

Isoetes coromandelina subsp. *macrotuberculata*

C.R. Marsden

(Fig. 1D–F)

Isoetes coromandelina L.f., Suppl. pl. 447 (1781) subsp. *macrotuberculata* C.R. Marsden, Contr. Austral. Herb. 24: 2 (1976).

Type: Mt Bunder Station, N.T., 26 Apr. 1974, C.R. Dunlop 3193; holo: AD; iso: AD, BM, BRI, CANB, DNA.

Aquatic or amphibious plants. Leaves 10–60 per plant, erect, flexible, 15–70 cm long, 0.5–2 mm diam., bright green, mostly subtriangular in transverse section but basally dilated; base to 20 mm wide, with broad membranous wings. Sporangia orbicular or obovate, 7–12 mm long; velum absent. Fertile megaspores 0.4–0.55 mm diam., white-grey; proximal faces usually with one large tubercle, sometimes a few large and several smaller tubercles present; distal face with numerous large tubercles. Infertile megaspores with the distal face with up to 10 or more tubercles, the proximal faces usually with 1 large tubercle but sometimes 2 or 3 tubercles present. Fertile plants: Feb.–July.

Distribution. Confined to northern Australia (W.A., N.T., Qld) and widespread in the Top End (p.75).

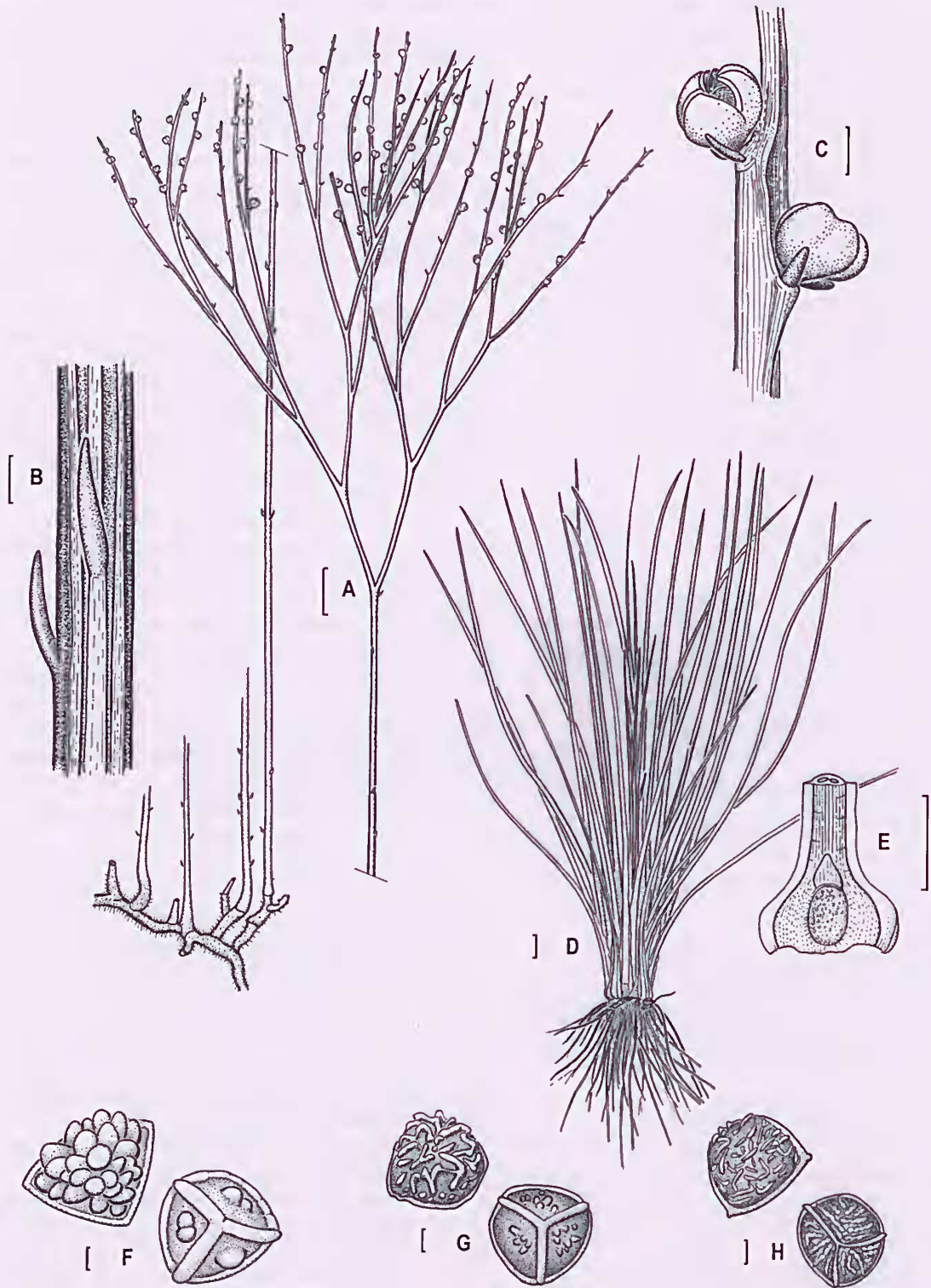


Fig. 1. A-C. *Psilotum nudum*: A, habit; B, part of stem with unbranched leaves; C, bifid leaves with trilobed synangia (A, B, Dunlop 9911; C, Russell-Smith 5260). D-F. *Isoetes coromandelina* subsp. *macrotuberculata*: D, habit; E, base of leaf with sporangia; F, megaspores, showing distal and proximal faces (D-F, Michell 2526). G, *Isoetes cristata*: megaspores, showing distal and proximal faces (Dunlop 4243). H. *Isoetes muelleri*: megaspores, showing distal and proximal faces (Latz 7130). Scale bars: A, D, E = 1 cm; B, C = 1 mm; F-H = 0.1 mm.

Habitat. Grows on the margins of seasonal swamps, in seepage areas, in ephemeral streams and, less commonly, on floodplains.

Notes. The only other subspecies, subsp. *coromandelina*, occurs on the Indian subcontinent. It differs in having smaller tubercles on the megaspores.

***Isoetes cristata* C.R. Marsden and Chinnock**
(Fig. 1G)

Isoetes cristata C.R. Marsden and Chinnock, Fl. Australia 48: 704 (1998).

Type: 10 km S of Jimmys Creek, N.T., 13 May 1976, C.R. Dunlop 4243; holotype: AD; isotype: AD, BM, DNA.

Amphibious plants. Leaves to ca 65 per plant, erect-patent, flexible, 6–16 cm long, 0.8–1.5 mm diam., bright green; base narrowly winged, translucent. Sporangia elliptic, 2.5–4.5 mm long; velum covering 5–15% of the sporangium. Fertile megaspores 0.3–0.45 mm diam., drying white or grey; distal face with wavy, often confluent ridges; proximal faces with 1–8 tubercles of similar or variable sizes, and usually at least one very prominent. Infertile megaspores with the distal face smooth or with faint to distinct ridge-like ornamentation, the proximal faces with one to several large tubercles plus sometimes several indistinct, small tubercles. Fertile plants: Mar.–May.

Distribution. Confined to, and widely dispersed in, northern N.T. but known only from the type collection plus two specimens from Nitmiluk NP and one each from the Wickham River region and Sturt Plateau (p. 75).

Habitat. Recorded from seasonally inundated swamps associated with dominant tree species such as *Asteromyrtus symphyocarpa*, *Corymbia polycarpa*, *Lophostemon lactifluus* and *Melaleuca nervosa*. Also collected from a seepage swamp on sandstone. At two localities it has been recorded as growing with *I. coromandelina*.

***Isoetes muelleri* A. Braun**
(Fig. 1H)

Isoetes muelleri A. Braun, Monatsber. Königl. Preuss. Akad. Wiss. Berlin 541 (1868).

Type: Rockhampton, Qld, 1867, P.O. 'Shanesy s.n.; lectotype: B (C.R. Marsden, J. Adelaide Bot. Gard. 1: 50 (1976); isotype: K.

[*Isoetes humilior* auct. non F. Muell. ex Braun; Chippendale, Proc. Linn. Soc. New South Wales 96: 216 (1972).]

Amphibious or aquatic plants. Leaves 5–25 per plant, erect or slightly recurved, 3–12 cm long, ca 1.5 mm diam., dark green; base ca 4 mm wide, white. Sporangia spheroidal or ellipsoid, 2.5–6 mm long; velum covering the sporangium. Fertile megaspores 0.3–0.5 mm diam., drying grey; all faces similarly ornamented with small ridges which are often confluent, occasionally with short ridges and small tubercle-like ornamentation.

Infertile megaspores with numerous small tubercles or very short ridges on the proximal faces. Fertile plants: Jan.–Sept.

Distribution. Australia (all states and mainland territories) (p. 75).

Habitat. In keeping with its highly polymorphic nature the taxon is found in a broad range of habitats, including ephemeral pools in arid regions, swamps and seepage areas in the tropics, and alpine tarns. In the N.T. it has been mostly collected from the south, including for example in pools on the top of Uluru (Ayers Rock), but is also found in Top End localities such as Mt Brockman.

Notes. A highly variable species in respect to spore morphology and many populations are known to be apomictic. A collection from Mt Gilruth, Jones 1539, has some fertile megaspores that approach those of *I. cristata* but the numerous tubercles on the proximal faces of the infertile megaspores suggests it is best placed with this species.

Lycopodiaceae

Family of four genera, all of which are represented in Australia but only *Lycopodiella* in the N.T.

Reference: Chinnock (1998c).

***Lycopodiella* Holub**

Plants terrestrial, main stems indeterminate, creeping or subterranean and giving rise to determinate branches from the dorsal surface. Roots dichotomously branched. Leaves simple, eligulate, with 1 central vein, arranged in alternating spirals or irregular whorls, equal or unequal in size and shape at any point on a branch. Stroboli (aggregated sporophylls) terminal and nodding on ultimate branchlets or (not N.T.) erect. Sporophylls subpeltate. Sporangia axillary or attached to the base of the sporophyll, unilocular. Spores rugose. Gametophyte on surface of substrate, tuberous, green and hemisaprophytic.

About 40 species in temperate and tropical regions of the world, with five in Australia and one in the N.T. The genus is closely related to, and sometimes included in, *Lycopodium* L.

***Lycopodiella cernua* (L.) Pic. Serm.**
(Fig. 2A–D)

Lycopodium cernuum L., Sp. pl. 2: 1103 (1753).

Lycopodiella cernua (L.) Pic. Serm., Webbia 23: 166 (1968).

Type: details not clear but including Hermann specimens from Sri Lanka; syn: LINN 1257.13, Herb. P. Hermann 1: 30 (BM 621335), Herb. P. Hermann 3: 45 (BM 621967).

Main stem stout, trailing, rooting at intervals. Determinate stems erect or climbing, to 100 cm tall and to 0.4 cm diam, the lower part simple, the upper part much branched. Leaves subwhorled or spirally arranged, somewhat linear or narrowly triangular, 2–5

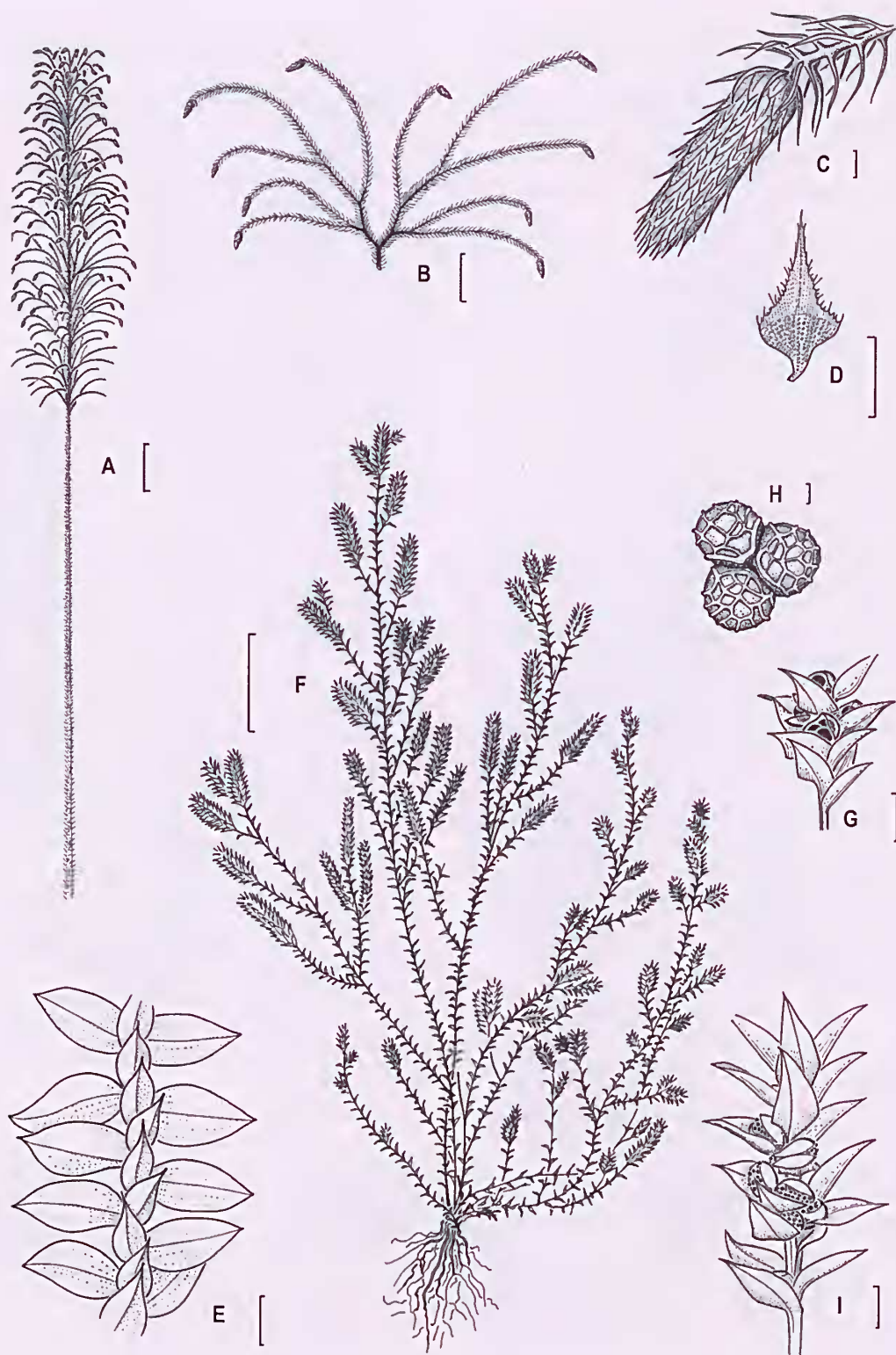


Fig. 2. A-D. *Lycopodiella cernua*: A, habit; B, branch with stroboli; C, strobilus; D, dorsal view of sporophyll (A-D, Wightman 645). E. *Selaginella ciliaris*: part of branch showing dimorphic leaves (Parker 884). F-I. *Selaginella pygmaea*: F, habit; G, sporophyll with megaspores; H, megaspores; I, sporophyll with microspores (F-I, Henshall 3620). Scale bars: A = 4 cm; B, F = 1 cm; C, D, E, G, I = 1 mm; H = 0.1 mm.

mm long, 0.2–0.5 mm wide, acuminate, yellowish or green. Strobili 3–10 mm long, 2–2.5 mm diam., nodding, on the ends of ultimate branchlets. Sporophylls somewhat ovate, 1.3–2 mm long, 0.5–1 mm wide, imbricate, margins finely toothed. Fertile plants: throughout the year.

Distribution. Pantropical species and widespread in Australia (W.A., N.T., Qld, N.S.W.). In the N.T. it is confined to northern regions, with the most southerly collection from Wollgorang Station (p.76).

Habitat. Permanently wet areas such as swamps, seepage areas and the banks of creeks in rainforest.

Selaginellaceae

A monogeneric family.

Reference: Jermy and Holmes (1998).

Selaginella P. Beauv.

Plants terrestrial or sometimes epiphytic, mostly perennial, heterosporous. Roots produced at the end of rhizophores (leafless branches). Stems creeping to erect, usually dichotomously branched and sometimes appearing pinnate. Leaves simple, monomorphic or dimorphic, decussate or spirally arranged, ligulate, with 1 central vein. Sporophylls terminal on stem and branches and normally aggregated into strobili. Sporangia solitary in axils of the sporophylls; megasporangia assuming the shape of the 4 large spores developed therein; microsporangia kidney-shaped to globose, with numerous microspores. Megaspores trilete, 200–800 µm diam., often rugose-reticulate. Microspores trilete, 20–60 µm diam., echinate to rugose.

A genus of ca 700 species, with 10 or 11 species in Australia.

Key to species of *Selaginella*

- 1a. Sterile leaves dimorphic *S. ciliaris*
- 1b. Sterile leaves monomorphic 2
- 2a. Stems erect; sporophylls in distinct strobili
..... *S. pygmaea*
- 2b. Stems prostrate; strobili indistinct
..... *Selaginella* (Mt Gilruth entity)

Selaginella ciliaris (Retz.) Spring

(Fig. 2E)

Lycopodium ciliare Retz., Obs. 5: 32 (1789).

Selaginella ciliaris (Retz.) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 233 (1843).

Type: Ceylon, *König*; holo: LD; iso: K.

Plants with the main stem creeping, to 10 cm long and branching and rooting throughout its length; branches leafy, ascending to erect, to ca 5 cm long. Leaves dimorphic, with median leaves directed along the axis and manifestly smaller than the lateral leaves which spread at an angle to the axis. Median leaves appressed, ovate to narrowly ovate, 0.9–1.7 mm long, 0.5–0.95 mm wide, base asymmetrical, apex acute to

acuminate, margins entire or with minute, widely spaced teeth. Lateral leaves somewhat ovate, asymmetric, 1.5–2.9 mm long, 0.8–1.5 mm wide, bases with or without scattered cilia, the upper margins not or slightly toothed. Strobili 5–15 mm long; sporophylls in the median position symmetrical or almost so, ovate, acute to acuminate, the margins with a few rigid cilia; sporophylls in the lateral position asymmetrical, somewhat ovate, obtuse to acute, the margins with a few minute teeth. Megaspores ca 210–280 µm diam., surface faintly reticulate, verrucose. Microspores ca 20–40 µm diam., surface granulose to tuberculose. Fertile plants: Feb.–Sept.

Distribution. Occurs from India to Taiwan and the western Pacific (Australia: W.A., N.T., Qld). Widespread in northern N.T., ranging from the Pickerton Ranges east to Gove Peninsula and as far south as Mallapunyah Station (p.78).

Habitat. A plant of moist situations, including rainforest floors, the grass understorey of wet sclerophyll forests, the edges of permanent water in sandstone outcrops, and *Melaleuca*-dominated seasonal swamps.

Notes. Jermy and Holmes (1998) described the species as a perennial but some collectors have recorded it as being an ephemeral or annual.

Selaginella pygmaea (Kaulf.) Alston

(Fig. 2F–I)

Lycopodium pygmaeum Kaulf., Enum. fil. 9 (1824).

Selaginella pygmaea (Kaulf.) Alston, J. Bot. 69: 257 (1931).

Type: in promontorio bonae spei ad radicem montis daiboli [Cape Province, South Africa], *Bergius s.n.*; holo: B.

[*S. uliginosa* auct. non (Labill.) Spring: Chippend., Proc. Linn. Soc. New South Wales 96: 216 (1972); Dunlop (ed.), Checklist Vasc. Pl. Northern Terr. 3 (1987); Jermy and Holmes, *Fl. Australia* 48: 89, fig. 44 (1998), p.p. as to *Symon* 7841.]

Plants annual, with a short rhizome; roots many and filamentous; stems tufted and erect, to 35 cm long, much branched. Leaves monomorphic, ovate to lanceolate, 1.1–1.7 mm long, 0.35–0.7 mm wide, apex acute, margins entire. Strobili 6–25 mm long; sporophylls ovate, 1.5–1.9 mm long, 0.7–0.9 mm wide, keeled, tapering to an acute point, margins usually entire, occasionally with one to several small teeth. Megaspores ca 250–350 µm diam., surface reticulate. Microspores ca 30–45 µm diam., surface with reticulate ridges or rugose. Fertile plants: all months.

Distribution. South Africa (Cape Province) and northern Australia (W.A., N.T., Qld). Within the N.T., it has been located as far south as the Pine Creek area and ranges east from Litchfield NP and the Tiwi Islands to the Mitchell Range and Lake Evella in eastern Arnhem Land (p.78).

Habitat. A plant of moist and often perennially wet situations, such as swamps and stream banks, and usually recorded as growing in sandy soil.

Notes. This name has been applied by Jermy and Holmes (1998) to N.T. material that has been previously included under the name *S. uliginosa*. They recorded "that much of the material seen compares well with that from Africa" and that there is considerable variation in Australian material, noting in particular that some robust specimens from the N.T. "may be genetically distinct or habitat forms" (Jermy and Holmes 1998).

A specimen, *Symon 7841*, from the N.T. was cited by Jermy and Holmes (1998) as belonging to *S. uliginosa*. I concur with the comments of Dr R. J. Chinnock (*in litt.*), who also kindly provided a photocopy of the AD specimen, that it fits within the circumscription of *S. pygmaea*.

Selaginella (Mt Gilruth entity)

Jermy and Holmes (1998) tentatively recognised an additional species for the N.T., referring to it as '*Selaginella* sp. A'. The entity was, and still is, only known from the one collection, *Jones 1543* (D22971), gathered 6 km south of Mt Gilruth (p.78). They suggested that it may be a juvenile form of *S. pygmaea*. It has prostrate stems (and therefore in habit resembles *S. ciliaris*) and indistinct stroboli but otherwise has monomorphic leaves and megaspores and microspores resembling those of *S. pygmaea*.

Division Polypodiophyta

The true ferns, with the Division containing, depending on the authority, somewhere between 40 and 77 families and more than 9000 species.

Ophioglossaceae

Three genera, all in Australia but *Botrychium* not in the N.T.

References: Andrews (1990), Wagener (1990), Chinnock (1998d).

Key to genera of Ophioglossaceae

- 1a. Sporangia clustered on short lateral branches of a cylindrical sporophore; veins of fronds free *Helminthostachys*
- 1b. Sporangia imbedded in two rows along a spike-like sporophore; veins of fronds anastomosing *Ophioglossum*

Helminthostachys Kaulf.

Plants terrestrial, the rhizome creeping, unbranched and with thick, fleshy roots. Fronds mostly solitary, the common stipe with rounded stipules at the base. Sterile lamina palmately divided into 3 parts, each of which is deeply lobed; veins free, dichotomously branched. Sporophore cylindrical and arising at the base of the sterile lamina, consisting of many short, lateral branches crowded together. Sporangia globose, opening by a vertical slit. Spores trilete, granular, yellowish.

Monotypic genus.

Helminthostachys zeylanica (L.) Kaulf.

(Fig. 3A)

Osmunda zeylanica L., Sp. pl. 2: 1063 (1753).

Helminthostachys zeylanica (L.) Kaulf. in Hook., Gen. fil. 7. 47B (1840).

Type: Sri Lanka, *P. Hermann*. Iso: Herb. P. Hermann 5: 272 (BM 621045).

Fronds 1 or sometimes 2. Stipe 10–50 cm long. Sterile lamina 8–23 cm long, tripartite. Pinnae usually 3 or 5 per division, rarely 2 or 6, narrowly elliptic or lanceolate, 6–21 cm long, 1–4 cm wide, margins entire, erenate or toothed, apex acute to obtuse. Sporophore 5–14 cm long on a stalk 6–12 cm long; lateral branches ca 0.5 mm long. Sporangia globular, 0.7–0.9 mm diam., brown. Fertile plants: throughout the year.

Distribution. India and Sri Lanka to Japan, Australia (W.A., N.T., Qld), New Guinea and New Caledonia (p.75).

Habitat. A species of shady forests and alluvial soils, including the margins of *Melaleuca* swamps and billabongs.

Ophioglossum L.

Plants terrestrial or epiphytic (not N.T.), the rhizome creeping or shortly erect, with fleshy roots. Fronds 1–several, the common basal stipe erect. Sterile lamina sessile or stalked, simple, venation reticulate. Sporophore a simple spike; sporangia immersed on either side of the axis and either extending to, or not reaching, the apex. Sporangia subglobose. Spores trilete or rarely monolet, globose, reticulate, pitted or warty, yellowish.

An almost cosmopolitan genus (excluding the Antarctic and Arctic) with perhaps 25–30 species. Species delineation is often problematic. Following Chinnock (1998d), seven occur in Australia, with six in the N.T.

Key to species of *Ophioglossum*

- 1a. Sporophore on a stipe fused to the sterile lamina and together forming a linear frond; sporangia reaching the apex of the sporophore *O. intermedium*
- 1b. Sporophore and lower part of the sterile lamina together forming a terete stipe; sporangia not reaching the apex of the sporophore 2
- 2a. Sterile lamina linear, at least six times as long as wide, sometimes absent *O. gramineum*
- 2b. Sterile less than six times as long as wide, always present 3
- 3a. Sterile lamina with a pale band running the length of the lamina and with a conspicuous midrib *O. costatum*
- 3b. Sterile lamina lacking a median band and without a conspicuous midrib 4



Fig. 3. A. *Helminostachys zeylanica*: fertile plant (Jones 1727, McKean DNA 35816). B. *Ophioglossum costatum*: fertile plant (Jones 1494). C-D. *Ophioglossum gramineum*: C, fertile plant; D, sterile plant (C, D, Henshall 1739). E. *Ophioglossum intermedium*: fertile plant (Leach 1699, Taylor 65A). F. *Ophioglossum reticulatum*: fertile plant (Jones 1460, Russell-Smith 8417). Scale bars: A = 2 cm, B-F = 1 cm.

- 4a. Old leaf bases persisting; stipe of sporophyll barely to obviously adnate for part of its length to the sterile lamina; roots not obviously fleshy *O. polyphyllum*
- 4b. Old leaf bases not persisting; stipe of sporophyll not adnate to the sterile lamina and arising at or below its base; roots tending to be fleshy 5
- 5a. Lamina thick and the venation obscure (southern N.T.) *O. lusitanicum*
- 5b. Lamina thin and with obvious venation (northern N.T.) *O. reticulatum*

***Ophioglossum costatum* R. Br.**

(Fig. 3B)

Ophioglossum costatum R. Br., Prodr. 163 (1810).

Type: Arnheim Bay, 14 Feb. 1803, *R. Brown Iter Austral.* 118; lecto: BM, *fide* Pic.Serm., Webbia 9: 626 (1954); isotype: K.

Rhizome erect, globose; roots many, fibrous. Fronds 1–5, erect and somewhat fleshy; old leaf bases not persisting. Common stipe 11–55 mm long. Sterile lamina ovate or somewhat elliptic, 11–65 mm long, 4.5–27 mm wide, with a prominent midrib and a pale median band; venation distinct. Sporophore 10–60 mm long; stipe 45–145 mm long and not or very slightly adnate to the base of the lamina; sporangia obviously not or sometimes almost reaching the apex, the sterile tip to 2 mm long. Fertile plants: Feb.–Mar.

Distribution. Widespread, ranging from Africa and Madagascar to Malesia and Australia (W.A., N.T., Qld). In the N.T. only recorded from the Top End, including Marrawal Plateau in Nitmiluk NP, Holmes Jungle and Bradshaw Station (p.77).

Habitat. Found in an array of moist habitats, including ephemeral creeks dominated by *Lophostemon grandiflora*, in swampy areas dominated by *Melaleuca*, and in jungles.

***Ophioglossum gramineum* Willd.**

(Fig. 3C, D)

Ophioglossum gramineum Willd., Abh. Kurfürstl.-Mainz. Akad. Nützl. Wiss. Erfurt 2: 18 (1802).

Type: near St Thomas, *Dr Friedland s.n.*; holo: B. [*O. lineare auct. non* Schltr. and Brause: Dunlop (ed.), Checklist Vasc. Pl. Northern Terr. 2 (1987).]

Rhizome erect, ovoid or cylindrical, roots fleshy. Fronds 1–4, erect; leaf bases not persistent. Common stipe 10–50 mm long. Sterile lamina linear-lanceolate or linear-elliptic, 15–65 mm long, 3–6 mm wide but often not developed; venation distinct. Sporophore 5.5–35 mm long, with a sterile tip 1–5 mm long; stipe 20–110 mm long; sporangia not reaching the apex and the sterile tip 1.5–6 mm long. Fertile plants: Feb.–May.

Distribution. A species commonly described as being pantropical but also extending to arid and temperate climes. In Australia found in W.A., N.T. and Qld (p.77).

Habitat. In northern N.T. the species has been found growing on poorly drained clayey sand of the Howard River floodplain and in moist depressions in sandstone regions of Nitmiluk NP and Kakadu NP. Southern collections are from the Davenport Range where plants were growing in damp silt at the edge of a seepage area, and from Gosse River in the Murchison Ranges where they were in a clay depression in grassland.

***Ophioglossum intermedium* Hook.**

(Fig. 3E)

Ophioglossum intermedium Hook., Icon. pl. 10: t. 995 (1854).

Type: Borneo, near Sarawak. *T. Lobb*; holo: K.

Rhizome short, creeping and fleshy. Fronds 1–6, erect, slightly fleshy. Common stipe and the sterile lamina forming a continuous, flattened, entire blade 50–380 mm long, 4–24 mm wide; venation usually distinct. Sporophore 20–45 mm long, 3–3.5 mm wide; stipe 30–80 mm long and distally fused to the face of the sterile lamina; sporangia reaching the apex. Fertile plants: throughout the year.

Distribution. Recorded from Indonesia, the Philippines and Australia (northern N.T. only). Localities include Koolondong Valley, Nitmiluk NP, Groote Eylandt and Melville Island (p.77).

Habitat. Mostly found in rainforest but also recorded in other areas with permanent or semi-permanent water, including a *Melaleuca*-dominated swamp in Nitmiluk NP.

***Ophioglossum lusitanicum* L.**

Adder's tongue

Ophioglossum lusitanicum L., Sp. pl. 2: 1063 (1753).

Type: Lusitania.

[*O. mdicane auct. non* L.: Dunlop (ed.), Checklist Vasc. Pl. Northern Terr. 2 (1987).]

Rhizome erect and cylindrical; roots few and tending to be fleshy; vegetative buds often resulting in dense colonies. Fronds 1 or 2, erect; old leaf bases not persisting. Common stipe 5–30 mm long. Sterile lamina ovate or elliptic, 10–35 mm long, 3–10 mm wide, thick, apex acute, basally gradually narrowing into the stipe; venation somewhat obscure. Sporophore 5–20 mm long; stipe 5–65 mm long and arising at or below the base of the lamina; sporangia not or sometimes almost reaching the apex, the sterile tip to ca 1 mm long. Fertile plants: Feb.–Sept.

Distribution. All continents except Antarctica, and in Australia in all States and Territories. In the N.T. confined to the southern region and collected from localities such as Ayers Rock (Uluru) and Simpsons Gap (p.77).

Habitat. Grows in seasonal depressions and on the edge of waterholes and watercourses.

Notes. The above account is predominantly based on Chinnoek (1998d) and specimens (e.g. *Latz 4891*) determined by him as being of this species. As he noted the species is highly variable and at least some specimens here referred to this species may be better placed in *O. polyphyllum*. Field work and the study of additional specimens should help clarify matters.

***Ophioglossum polyphyllum* A. Braun**

Ophioglossum polyphyllum A. Braun in M.A. Seubert, Fl. azor. 17 (1844).

Type: near Djeddah, 2 Jan. 1836, *Schimper?*; iso?: BM, G, P.

Rhizome erect and cylindrical; roots usually many and somewhat fibrous and stiff. Fronds 2 or 3, erect, robust; old leaf bases persisting and forming an obvious sheath. Common stipe 10–60 mm long. Sterile lamina lanceolate or narrowly elliptic, 20–70 mm long, 6–14 mm wide, leathery, apex acute. Sporophore 5–16 mm long; stipe 7–45 mm long, barely to manifestly adnate for part of its length to the sterile lamina; sporangia not or almost reaching the apex and the sterile tip less than *ca* 1 mm long. Fertile plants: Feb.–Nov.

Distribution. Portugal and Africa to India, south-east Asia and Australia (all mainland States and Territories). In the N.T. only known from the southern region, with all specimens collected below 22° S (p.77).

Habitat. Ephemeral wet depressions, including those in mulga woodland, chenopod shrubland and gibber plains.

***Ophioglossum reticulatum* L.**

(Fig. 3F)

Ophioglossum reticulatum L., Sp. pl. 2: 1063 (1753).

Type: Fond de Baudin, near Léogane, Haiti; lecto: plate 164 in C. Plumier, Traité Foug. Amér. (1705), *fide* G.R.Procter, *Ferns Jamaica* 55 (1985).

[*O. nudicaule* auct. non L.: Dunlop (ed.), Checklist Vase. Pl. Northern Terr. 2 (1987), e.g. as to *Jones 1555* and 1723.]

Rhizome erect, ovoid; roots often somewhat fleshy; vegetative buds may result in colonies. Fronds 1 or 2, erect. Common stipe 12–150 mm long. Sterile lamina circular to widely elliptic, widely ovate to ovate or obovate, 6–75 mm long, 4–32 mm wide, more or less uniform in colour and lacking a distinct midrib, thin, apex acute to obtuse, basally abruptly narrowing into the stipe; venation usually obvious. Sporophore 4.5–40 mm long; stipe 30–180 mm long and attached at or below the base of the lamina; sporangia obviously not or sometimes almost reaching the apex, the sterile tip to *ca* 1.5 mm long. Fertile plants: Nov.–July.

Distribution. Usually cited as being a pantropical species, although at least in Australia (W.A., N.T., Qld, N.S.W., Vic.) ranging from tropical to temperate regions; in the N.T. restricted to the north (p.77).

Habitat. Commonly collected in rainforest but also found in wet areas in sandstone woodland.

Notes. Chinnoek (1998d) commented on the highly polymorphic nature of the species, noting that in northern Australia specimens from forests were very robust compared to small forms from the sandstone.

Marattiaceae

Four genera and about 300 subtropical or tropical species; in Australia just two species, *Angiopteris evecta* and *Marattia oreades*, with only the former in the N.T.

Reference: Camus (1998).

***Angiopteris* Hoffm.**

Plants terrestrial, large, homosporous. Rhizome an erect trunk which is obscured by the persistent frond bases (stipules). Fronds large, clustered. Lamina 1- or 2-pinnate; pinnae with swollen, jointed bases, veins free, simple or 1-forked at the base. Sori lacking an indusium, submarginal along lateral veins, each composed of a ring or double row of sporangia. Spores typically globose and trilete.

A taxonomically unresolved genus of the Old World tropics (excluding Africa) with *ca* 200, mostly poorly defined, species described and only *A. evecta* in Australia.

***Angiopteris evecta* (G. Forst.) Hoffm.**

(Fig. 4A–C)

Polypodium evectum G. Forst., Fl. Ins. Austr. 81 (1786).

Angiopteris evecta (G. Forst.) Hoffm., Commentat. Soc. Regiae Sci. Gott. 12: 29 (1796).

Type: Society Is., *G. Forster s.n.*; ?iso: BM.

Trunk short to *ca* 90 cm tall. Fronds to more than 4 m long. Stipe up to 2/3 the total length of the frond. Lamina 2-pinnate. Pinnae alternate, *ca* 9 pairs, to 150 cm long. Pinnules essentially linear-lanceolate or narrowly oblong but usually with an acuminate apex, 3.5–18.5 cm long, 1–2.5 cm wide, alternate, the apex manifestly toothed, the sides inconspicuously toothed. Sori with 6–10 sporangia. Fertile plants: *ca* Nov.

Distribution. A species of the Old World tropics; in Australia in the N.T., Qld and N.S.W. The only wild-collected specimens from the N.T. are from near Mirrngadja, eastern Arnhem Land (p.73).

Habitat. Spring-fed jungle in sandstone gorges.

Notes. Known to be in cultivation in the Howard Springs region.

Hymenophyllaceae

Family delimitation is problematical; following Iwatsuki it contains eight genera and *ca* 800 species. Only *Cephalomanes obscurum* in the N.T.

References: Iwatsuki (1990), Bostock and Spokes (1998a).

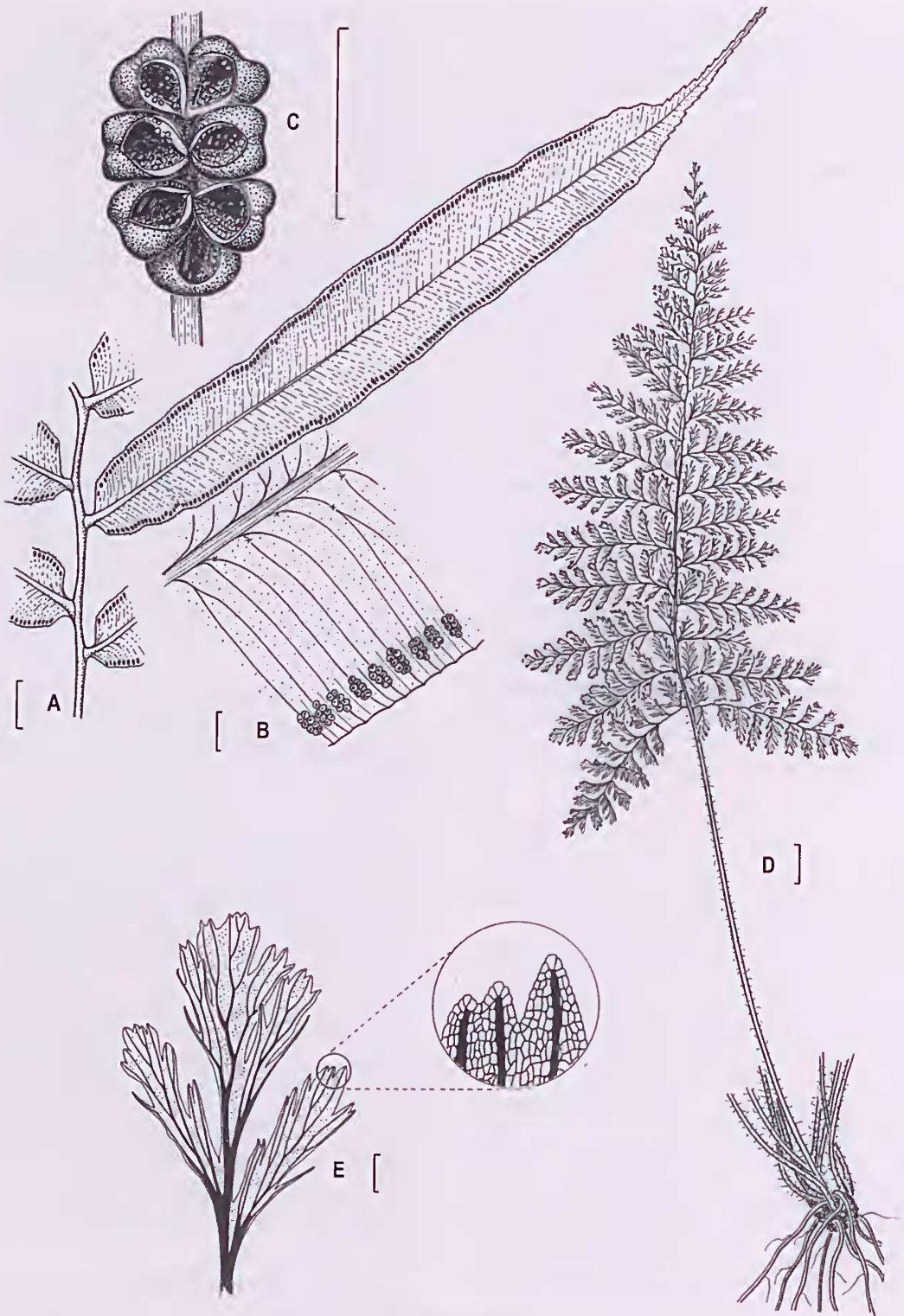


Fig. 4. A-C. *Angiopteris evecta*: A, part of pinna showing pinnule arrangement and details of a single pinnule; B, lower surface of pinnule showing venation and submarginal sori; C, sorus with seven sporangia (A-C, Russell-Smith 3962). D, E. *Cephalomanes obscurum*: D, single frond with attached rhizome; E, ultimate segments, with enlargement showing cell detail (D-E, Jones 1292). Scale bars: A, D = 1 cm, B = 2 mm, C, E = 1 mm.

***Cephalomanes* C. Presl**

Plants terrestrial or lithophytic, homosporous. Rhizome creeping or erect, with wiry, often stilt-like roots and shiny, multicellular hairs. Stipes distinct, terete, usually with a narrow wing, bearing stiff hairs at least when young. Lamina variously pinnate; rachis usually winged; ultimate segments 1-cell thick except for the veins. Sori usually at the tips of ultimate segments; indusium (or involucre) cylindrical or cup- or bell-shaped; receptacle usually long and manifestly exerted.

A genus of *ca* 60, mostly Old World, species, with four in Australia but only *C. obscurum* in the N.T.

***Cephalomanes obscurum* (Blume) K. Iwats.**

(Fig. 4D, E)

Trichomanes obscurum Blume, Enum. pl. Javae 227 (1828).

Selenodesmium obscurum (Blume) Copel., Philipp. J. Sci. 67: 81 (1938).

Cephalomanes obscurum (Blume) K. Iwats., J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 13: 547 (1985).

Type: Buitenzorg [Bogor, Java], *A. Zippelius s.u.*; lecto: L, *fide* C.V. Morton, Contr. U.S. Natl. Herb. 38: 381 (1974).

Plants terrestrial; rhizome creeping or erect and several cm tall; roots rigid. Fronds clustered, 3–26 cm long. Stipes unwinged, 2–11 cm long, with rigid, uniseriate, septate, reddish hairs which often extend to the rachis. Lamina 3-pinnate or 3-pinnate-pinnatifid, 2–15 cm long, 1–8 cm wide, thin and dark green; ultimate segments flat or curled. Sori on short lobes in the axis of tertiary segments; indusium (or involucre) cylindrical, 1–1.5 mm long, barely winged; receptacle projecting *ca* 0.5–2.5 mm beyond the involucre. Fertile plants: Jan.–Sept.

Distribution. From Sri Lanka and India east to Malesia, Solomon Islands and Australia (N.T., Qld, N.S.W.). In the N.T. only known from the Magela Creek area and from Taracumbie Falls on Melville Island (p.74).

Habitat. Splash zone of permanent waterfalls.

Gleicheniaceae

A family of about 125 species placed, following Kramer, in five genera; 13 species in four genera recognised in Australia.

References: Andrews (1990), Kramer (1990b), Chinnock and Bell (1998).

Key to genera of *Gleicheniaceae*

- 1a. Rhizome with branched hairs; lateral veins of ultimate segments twice- or more forked; sori mostly with more than 8 sporangia *Dicranopteris*
- 1b. Rhizome with scales; lateral veins of ultimate segments simple or once-forked, sometimes obscure; sori usually with fewer than 8 sporangia 2

- 2a. Largest ultimate segments less than 5 mm long *Gleichenia*
- 2b. Largest ultimate segments to *ca* 20 mm long *Sticturus*

***Dicranopteris* Bernh.**

Plants terrestrial, homosporous. Rhizome creeping, with septate, branched hairs. Fronds complex, the lamina several-times, equally or unequally, pseudodichotomously forked, the primary branches with dormant vegetative buds between them and accessory, divided segments often present at the forks; ultimate branches 1-pinnatifid; venation dichotomous, veins of ultimate segments at least twice-forked. Sori usually single on a secondary vein, exindusiate, each with 5–15 sporangia; paraphyses absent. Spores trilete or monolete.

A mostly pantropical genus of about 12 species, with only *D. linearis* in Australia.

Dicranopteris linearis* (Burm.f.) Underw.*var. *linearis***

(Fig. 5A–D)

Polypodium lineare Burm.f., Fl. indica 235 (1768).

Dicranopteris linearis (Burm.f.) Underw., Bull. Torrey Bot. Club 34: 250 (1907).

Type: Java.

Rhizome with reddish, septate, branched hairs and some simple hairs. Fronds to 2 m or more long, scrambling or trailing, commonly 2- or 3-times pseudodichotomously branched; rachis with scattered branched hairs but generally appearing glabrous; ultimate branches 10–25 cm long, 1-pinnatifid; ultimate segments linear, to 50 mm long and 6 mm wide, decreasing in size towards the apex of the branch, leathery, upper surface glabrous, undersurface barely to obviously glaucous and often with scattered, minute reddish glandular hairs on minor veins and some branched, reddish hairs at the base of the midrib. Fertile plants: throughout the year.

Distribution. A highly variable species, with Chinnock and Bell (1998) tentatively recognising three varieties in Australia and noting the need for more thorough investigation. Following them the N.T. specimens are referable to var. *linearis*, a taxon they list as extending from Africa and Asia to Australia (W.A., N.T., Qld, N.S.W.) and New Zealand. In the N.T. it is mainly found in the Top End but also occurs in the southern region on permanent springs such as in the Chewings Range (p.75).

Habitat. A common fern in monsoon rainforest, sandstone gorges and other areas with permanent or near-permanent water, including seepage areas behind mangroves.

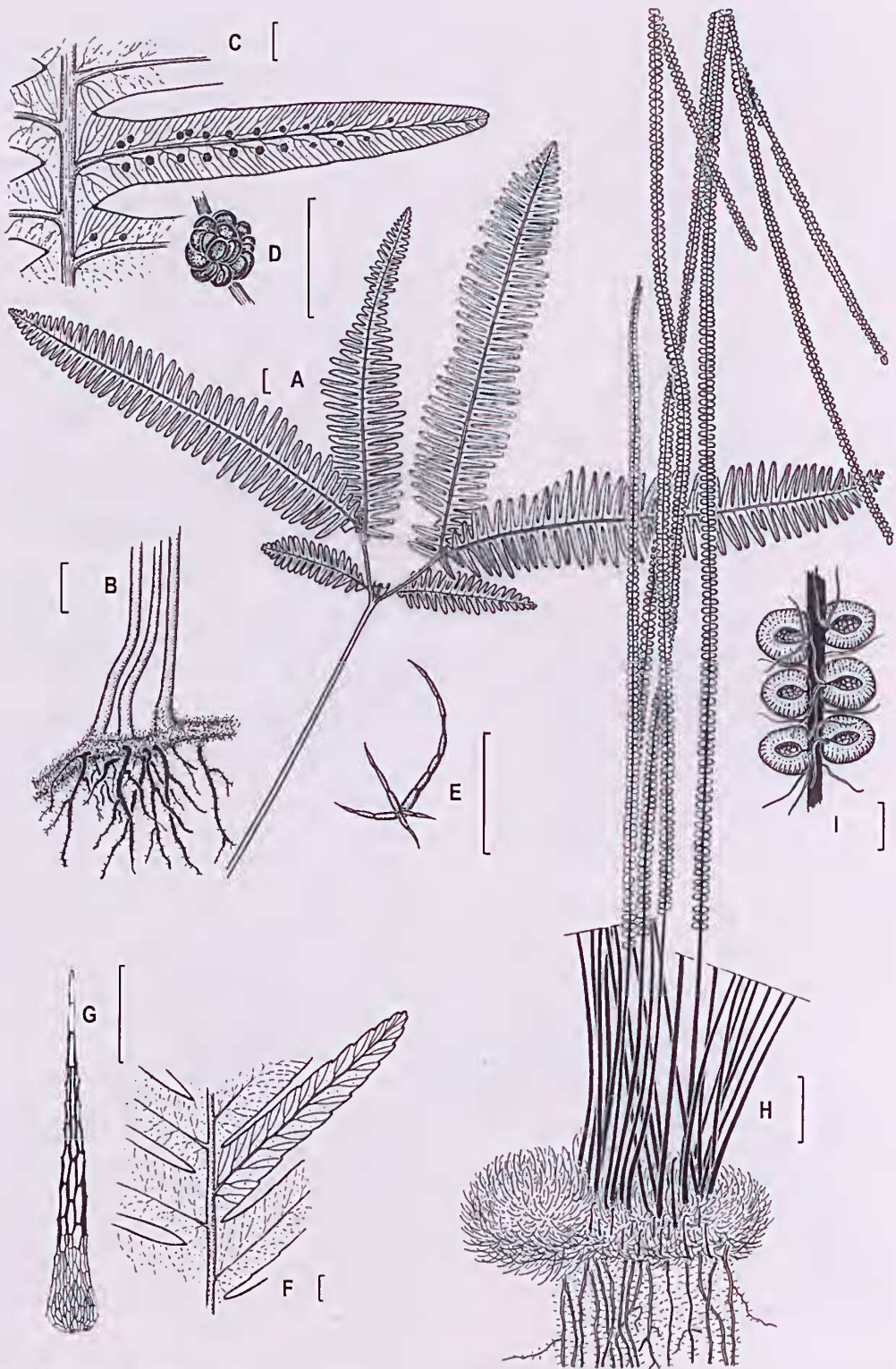


Fig. 5. A-E. *Dicranopteris linearis* var. *linearis*: A, part of frond; B, rhizome; C, ultimate segment showing venation and position of sori; D, sorus; E, rhizome hair (A, B, E, Callis 22, C,D, Dunlop 9878). F, G. *Sticherus flabellatus* var. *compactus*: F, ultimate segment showing venation; G, rhizome scale (F, G, Russell-Smith 4816). H, I. *Platyzoma microphyllum*: H, habit; I, lower surface of fertile pinnules (H, I, Egan 2757). Scale bars: A, B, H = 1 cm, C = 2 mm, D-G, I = 1 mm.

***Gleichenia* Sm.**

Plants terrestrial, homosporous. Rhizome long-creeping, wiry, with scales and sometimes hairs; scales entire or with ciliate margins. Fronds variable, glabrous or with stellate hairs and/or ciliate scales, the lamina 1-pinnate-pinnatifid or with 1-pinnate-pinnatifid primary branches or pseudodichotomously branched, with vegetative buds in the forks, the ultimate branches (pinnules) determinate, linear, reducing in size towards the end of the branch and 1-pinnate-pinnatifid; ultimate segments flat, revolute, strongly recurved or with a pouched undersurface; veins of ultimate segments simple or once-forked. Sori single on the ultimate segments, exindusiate, with 1–4 sporangia, paraphyses absent. Spores trilete, tetrahedral.

A genus of *ca* ten species ranging from southern Africa to Australia (six spp.) and New Caledonia. Absent from the New World.

Within the N.T. the genus is only known by a few specimens, gathered from Twin Falls (Kakadu NP) and the Victoria River region. They were not treated in the *Flora of Australia* and their identity is by no means certain although the Twin Falls specimen seems referable to *G. dicarpa*.

Key to species of *Gleichenia*

- 1a. Largest ultimate segments less than 2 mm long; sporangia 1 or 2 per sorus *G. dicarpa*
- 1b. Largest ultimate segments more than 3 mm long; sporangia up to 4 per sorus
..... *Gleichenia* (Victoria River entity)

***Gleichenia dicarpa* R. Br.**

(Fig. 6A–C)

Gleichenia dicarpa R. Br., Prodr. 161 (1810).

Type: Dalrymple, Tas., *R. Brown Iter Austral.* 108; syn: BM, K.

Rhizome with dark red-brown scales with ciliate margins. Fronds with dormant vegetative buds in each fork. Stipe red-brown to yellowish, bearing yellow-brown stellate hairs and long-ciliate scales. Pinnules 1–6 cm long, with *ca* 12–80 ultimate segments, costa yellowish, with pale brown, ciliate scales along its length. Ultimate segments 1–1.8 mm long, 0.8–1 mm wide, almost flat, only old growth with obvious recurved margins and rarely slightly pouched, discoloured, the upper surface green, the lower grey-green. Sori with 1 or 2 sporangia. Fertile plants: Dec.

Distribution. Ranges from Malaysia to Australia (N.T., Qld, N.S.W., Vic., Tas.), New Caledonia and Australia. In the N.T. it is only known from *Brennan 1996* which was collected from a gorge near Twin Falls in 1992 (p.75).

Habitat. The only collection comes from a permanently wet sandstone wall.

Notes. The presence of vegetative buds, 1 or 2 sporangia per sorus and scale morphology are all

features that support the placement of *Brennan 1996* in *G. dicarpa*. However, the collection is atypical in that the ultimate segments are usually not manifestly pouched, this feature is only developed – and barely so – in just a few old segments.

***Gleichenia* (Victoria River entity)**

(Fig. 6D, E)

Rhizome with brown scales with coarse-ciliate margins. Fronds with dormant vegetative buds in each fork. Stipe red-brown, with scattered brown or whitish stellate hairs and brown, long-ciliate scales. Pinnules 1–7.5 cm long, with 18–80 ultimate segments, costa yellowish-brown, usually glabrous but sometimes several pale brown, long-ciliate scales near the base. Ultimate segments 1.5–4.5 mm long, 0.7–1.9 mm wide, almost flat, only old growth with obvious recurved margins, slightly discoloured, both surfaces green but the upper surface marginally darker than the lower. Sori with 2–4 sporangia. Fertile plants: Apr.–May.

Distribution. Victoria River district (p.75).

Habitat. All specimens are from apparently permanent seepage areas on sandstone escarpment.

Notes. This entity is only represented in DNA by four separate specimens collected in 2001. On one specimen it is recorded as being locally abundant, on another that it was regenerating after fire.

Although the above-mentioned are the only recently collected specimens, Ferdinand Mueller also gathered the same entity from the upper Victoria River during the 1855–56 North Australian Expedition (P. Bostock, *in litt.*).

In vestiture this entity is not dissimilar to the Twin Falls specimen referred above to *G. dicarpa*, but it differs in having larger ultimate segments and in the number of sporangia per sorus. It also lacks manifestly pouched segments. Chinnock and Bell (1998) recognised three other Australian species of *Gleichenia* which have 2–4 sporangia per sorus but none have such large ultimate segments and also differ in one or more other features.

***Sticherus* C. Presl**

Plants terrestrial, homosporous. Rhizome creeping, with peltately attached scales which are at least apically ciliate or fimbriate. Fronds usually scandent, complex, pinnately branched or repeatedly pseudodichotomously branched, primary branches with dormant vegetative buds between them, ultimate branches deeply pinnatifid; accessory branches absent; ultimate segments more or less oblong or linear, with once-forked lateral veins. Sori on distal branches of veins, exindusiate, arranged in a single row on either side of the midrib of the ultimate segments, each with 2–8 sporangia; paraphyses present or absent. Spores monolete, ellipsoidal.

A mainly pantropical genus of *ca* 80–100 species, with three species in Australia and one in the N.T.

Sticherus flabellatus var. *compactus*

(C.T. White and Goy) D.A. Sm.

(Fig. 5E, F)

Umbrella fern, shiny fan fern

Sticherus flabellatus (R. Br.) H. St. John var. *compactus* (C.T. White and Goy) D.A. Sm., N. Queensland Naturalist 14: 6 (1946).

Type: Mt Spurgeon, Qld, Sept. 1936, C.T. White 10556; holo: BRI.

Rhizome long-creeping, (2–) 3–4.5 (–7) mm diam., tuberculate; scales lanceolate, brown, the margins barely toothed or with short, stiff cilia. Stipe *ca* 10–20 (–70) cm long, with scales at the base. Fronds with the rachis 2- or 3-times forked. Ultimate branches 10–17 cm long. Ultimate segments linear, 5–20 mm long, 1–2.5 mm wide, margins at least apically toothed and commonly so for *ca* ½ their length, glabrous. Sori with 2–5 (8) sporangia. Sporangia (2–) 2.5–3 mm diam. Fertile plants: Feb.

Distribution. Endemic to north-east Qld and the N.T. where it is only known from north-east Arnhem Land (p.78).

Habitat. Sandstone cliffs in riparian vine forest.

Notes. The specimen *Russell-Smith 4816* is the only one of this taxon held at DNA. The segments are glabrous but Chinnock and Bell (1998) noted that the lower segments may have branched hairs and ciliate scales. Extreme measurements given in brackets in the above description are from Chinnock and Bell's account of the species.

Two varieties of *S. flabellatus* have been recognised, the var. *flabellatus* from New Guinea, New Caledonia, New Zealand and the east coast of Australia differing from var. *compactus* by having ultimate segments that are 20–45 mm long and sporangia *ca* 4 mm in diameter.

Platyzomataceae

A monospecific family confined to Australia.

Reference: Chinnock (1998c).

***Platyzoma* R. Br.**

Plants terrestrial, large, heterosporous. Rhizome short, condensed, densely covered in unbranched, uniseriate hairs. Fronds clustered, erect and dimorphic, being simple or pinnate, non-circinnate. Stipe short, glabrescent. Lamina simple or 1-pinnate, the pinnules sessile or shortly stalked, pouch-like due to strongly revolute margins; veins free. Sori absent, the sporangia borne singly at the tips of veins and protected by the revolute margins. Sporangia with the annulus oblique or irregular. Spores dimorphic, each sporangium with spores of one kind, with up to 16 large spores or to 32 small spores per sporangium; globose and trilete and tetrahedral or bilateral and either monollete or trilete.

***Platyzoma microphyllum* R. Br.**

(Fig. 5G, H)

Platyzoma microphyllum R. Br., Prodr. 160 (1810).

Type: Facing Island, Qld, R. Brown *Iter Austral.* 102; lecto: BM; isolecto: K.

Tussock-forming fern with clumps up to several metres across. Rhizomes creeping, clothed in simple, uniseriate, often orange-brown hairs. Simple fronds linear or filiform, 40–100 mm long, 0.2–0.5 mm wide. Pinnately-divided fronds 150–700 mm long, 2.5–4.5 mm wide; stipes reddish or dark brown, *ca* ¼ or less than the total length of the frond, hairy, the hairs uniseriate, septate, eglandular, whitish and somewhat transparent; pinnules ovate or somewhat circular, 0.7–2.3 mm long, 0.65–1.8 mm wide, glabrous except for short, glandular hairs along the recurved margins, the lower surface usually with yellowish deposits. Sporangia *ca* 4–6 per pinnule. Fertile plants: throughout the year.

Distribution. Confined to northern Australia (W.A., N.T., Qld, N.S.W.), with all specimens in the N.T. collected above 17° S (p.77).

Habitat. A common fern in low-lying, seasonally inundated woodland and tending to favour sandy soil.

Ethnobotany. In some areas Aboriginal people are known to use fronds to make children's necklaces (Wightman and Smith 1999).

Marsileaceae

A family containing three genera (two in Australia) and about 70 species. Only *Marsilea* in the N.T.

References: Andrews (1990), Jones (1998a), Short (2000).

***Marsilea* L.**

Nardoo

Rhizome long-creeping. Fronds scattered along rhizome, the lamina of 2 pairs of opposite, closely spaced leaflets at the end of a long stipe, the whole having the appearance of a 4-leaved clover; leaflets glabrous or hairy, margins entire or crenate, veins radiating from the base. Sporocarps (or conceptacles) thick-walled, 2-valved, stalked, solitary or clustered at the base of or along the stipes, smooth or ribbed, glabrous or hairy, usually with 1 or 2 basal teeth which may be associated with the apex of the stalk. Sori exuded in a gelatinous mucilage.

A cosmopolitan genus of about 70 species. Species delimitation is generally problematic within *Marsilea*. Jones (1998a) noted that *M. drummondii* is highly polymorphic but it is evident that species are generally poorly delimited, with supposed differences in features of the sporocarp being highly subjective. Jones recognised eight species for Australia, recording all for the N.T., but *M. exarata* is not recognised here and attention is drawn to a peculiar entity collected from Neutral Junction Station.

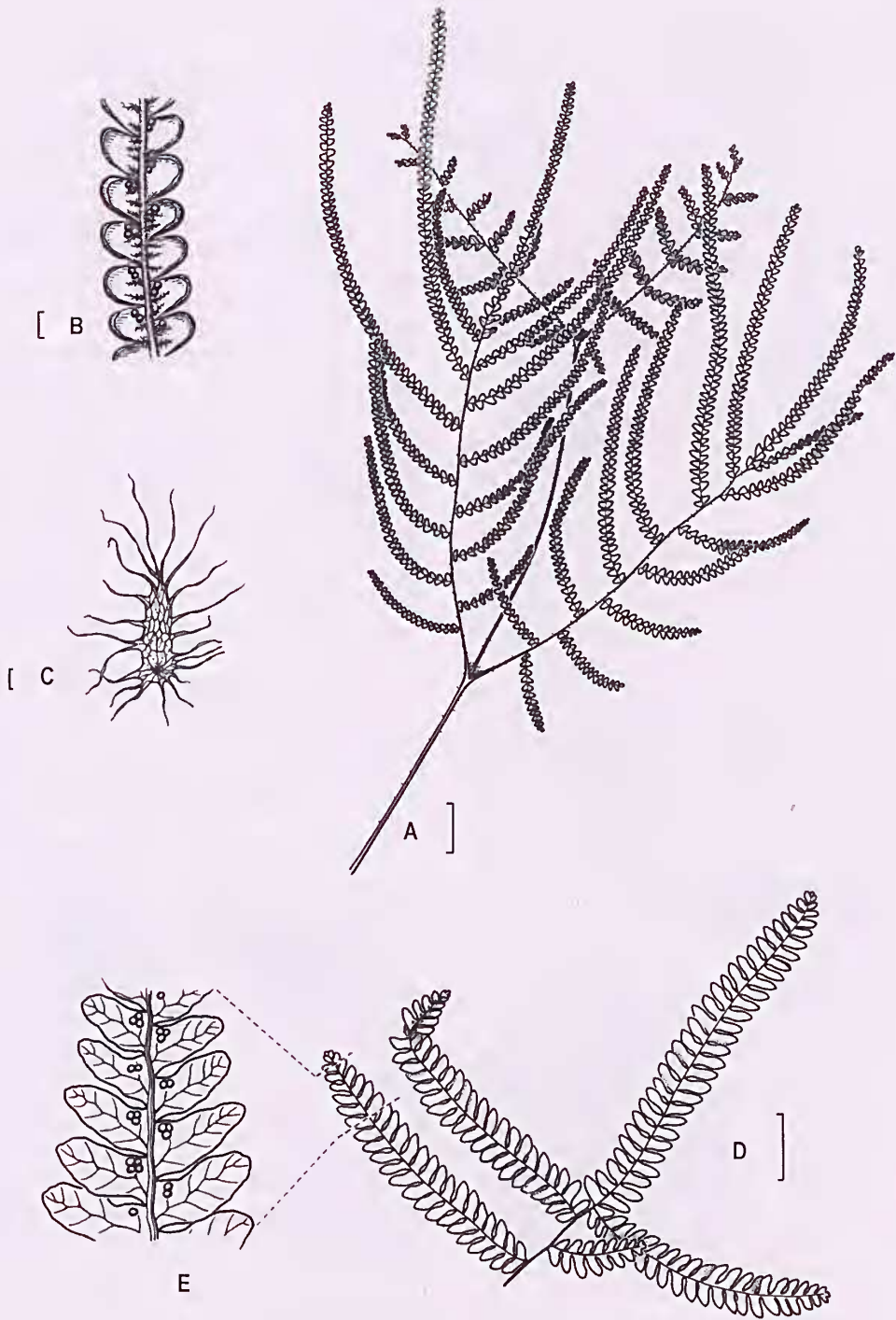


Fig. 6. A-C. *Gleichenia dicarpa*: A, part of frond; B, lower surface of pinnule showing sporangia and scales on ultimate segments; C, scale from stipe (A-C, Brennan 1996). D, E. *Gleichenia* (Victoria River entity): D, part of frond; E, lower surface of pinnule showing sporangia on ultimate segments (D, E, Cowie 1993). Scale bars: A, D = 1 cm, B = 1 mm, C = 0.1 mm.

In *Marsilea*, the hairs on the leaflets, stalks and sporocarps are not basally attached but are bifid. They have a very short arm and a much longer arm, so much so that they may appear to be simple, particularly when the long arm is spreading rather than appressed.

Key to species of *Marsilea*

- 1a. Sporocarps in clusters and enveloped in long, woolly hairs obscuring their presence at the base of fronds *Marsilea* (Neutral Junction entity)
- 1b. Sporocarps glabrous or with hairs but the hairs neither woolly nor obscuring the presence of the sporocarps 2
- 2a. Sporocarps lacking basal teeth; fresh leaflets with obvious colour band *M. mutica*
- 2b. Sporocarps with 1 or 2 basal teeth; fresh leaflets lacking a colour band 3
- 3a. Sporocarp with 1 tooth; leaflets mostly more than 3-times as long as wide *M. angustifolia*
- 3b. Sporocarp with 2 teeth; leaflets less than 3-times as long as wide 4
- 4a. Sporocarps 5.5–13 mm long, with the basal tooth obtuse and longer and broader than the upper, somewhat pointed, tooth; stalks usually 2-times or more the length of the sporocarp, rarely the length of the sporocarp *M. drummondii*
- 4b. Sporocarps 2.5–7 mm long, with teeth about equal in length or the upper one longer and narrow than the lower or the lower one narrower and longer than the upper; stalks mostly less than the length of the sporocarp but sometimes to about twice its length 5
- 5a. Sporocarps unribbed, commonly red-punctate beneath the hairs, the upper tooth narrow, longer and more pointed than the lower *M. crenata*
- 5b. Sporocarps ribbed or unribbed, the teeth not as above 6
- 6a. Sporocarps longer than their stalks *M. latzii*
- 6b. Sporocarps shorter than their stalks 7
- 7a. Sporocarps 2.5–3 mm long, obviously ribbed *M. costulifera*
- 7b. Sporocarps mostly more than 3 mm long (if less then not ribbed), smooth or slightly to obviously *M. hirsuta*

Marsilea angustifolia R. Br.

(Fig. 7A)

Marsilea angustifolia R. Br., Prodr. 167 (1810).

Type: tropical coast of Australia, R. Brown; holo: BM.

Rhizome glabrous except for prominent tufts of orange-brown hairs on growing tips. Stipes 4–22 cm long, slender, glabrous or sparsely hairy. Leaflets mostly narrowly elliptic or oblanceolate, 8–34 mm long, 2–9 mm wide, entire or with apices with irregular small teeth, glabrous or sparsely hairy. Sporocarp 6–7 mm long, densely hairy, basally with a single blunt tooth;

stalk about the length or to ca 1.5-times the length of the sporocarp, rarely the apex somewhat tooth-like. Fertile plants: Apr.

Distribution. Endemic to Australia (W.A., N.T.) and widespread in the N.T. (p.76).

Habitat. Grows in clay and sandy soils on the margins of seasonal swamps and streams.

Notes. Rarely collected with sporocarps.

Marsilea costulifera D.L. Jones

Marsilea costulifera D.L. Jones, Muelleria 8: 65, fig. 1 (1993).

Type: Gilgunnia, N.S.W., 31 Dec. 1903, W. Baeuerlen 3175; holo: NSW.

Rhizome much-branched, glabrous except for growing tips. Stipes 0.5–6 cm long, glabrous or hairy. Leaflets obovate to narrowly oblanceolate or cuneate, 2–5.5 mm long, 1–3 mm wide, margins entire, very sparsely to densely hairy. Sporocarp 2.5–3 mm long, hairy, with distinct ribs, basally with 2 teeth, the upper one large and blunt, the lower tooth comparatively small and blunt; stalk 1–2 mm long, unbranched. Fertile plants: May–Sept.

Distribution. Australia (N.T., S.A., Qld, N.S.W., Vic.). In the N.T. restricted to the southern region (p.76).

Habitat. Claypans and swamps often dominated by *Muehlenbeckia* (e.g. *Albrecht* 9684).

Notes. Approaches forms which are otherwise here placed in *M. hirsuta*.

Marsilea crenata C. Presl

(Fig. 7B–D)

Marsilea crenata C. Presl, Reliq. haenk. 1: 84 (1825).

Type: Philippine Islands, T. Haenke; holo: ?PRC.

Rhizome long-creeping, mostly glabrous or sparsely hairy but usually densely hairy at base of peduncles and stipes. Stipes 2–15 cm long, glabrous or sparsely hairy. Leaflets widely obovate to widely depressed obovate, 4–20 mm long, 4–19 mm wide, at least the largest leaflets glabrous or with scattered, slightly spreading hairs, margins entire or apically crenate. Sporocarp 2.5–3.5 mm long, mostly hairy but some of the surface often glabrous, with hairs removed appearing uniformly dark reddish brown or black and commonly red-punctate, unribbed, with 2 basal teeth, the upper tooth somewhat larger and pointed, the lower tooth smaller and apically rounded; stalks 2.5–6 mm long, shorter to nearly 2-times the length of the sporocarps. Fertile plants: Feb.–Sept.

Distribution. South-east Asia (including the Philippines), New Guinea and Australia (W.A., N.T., Qld). Widespread in the N.T., from northern localities such as Fogg Dam, Melacca Swamp and floodplains of the Adelaide and Daly Rivers, to as far south as the Alice Springs district (p.76).

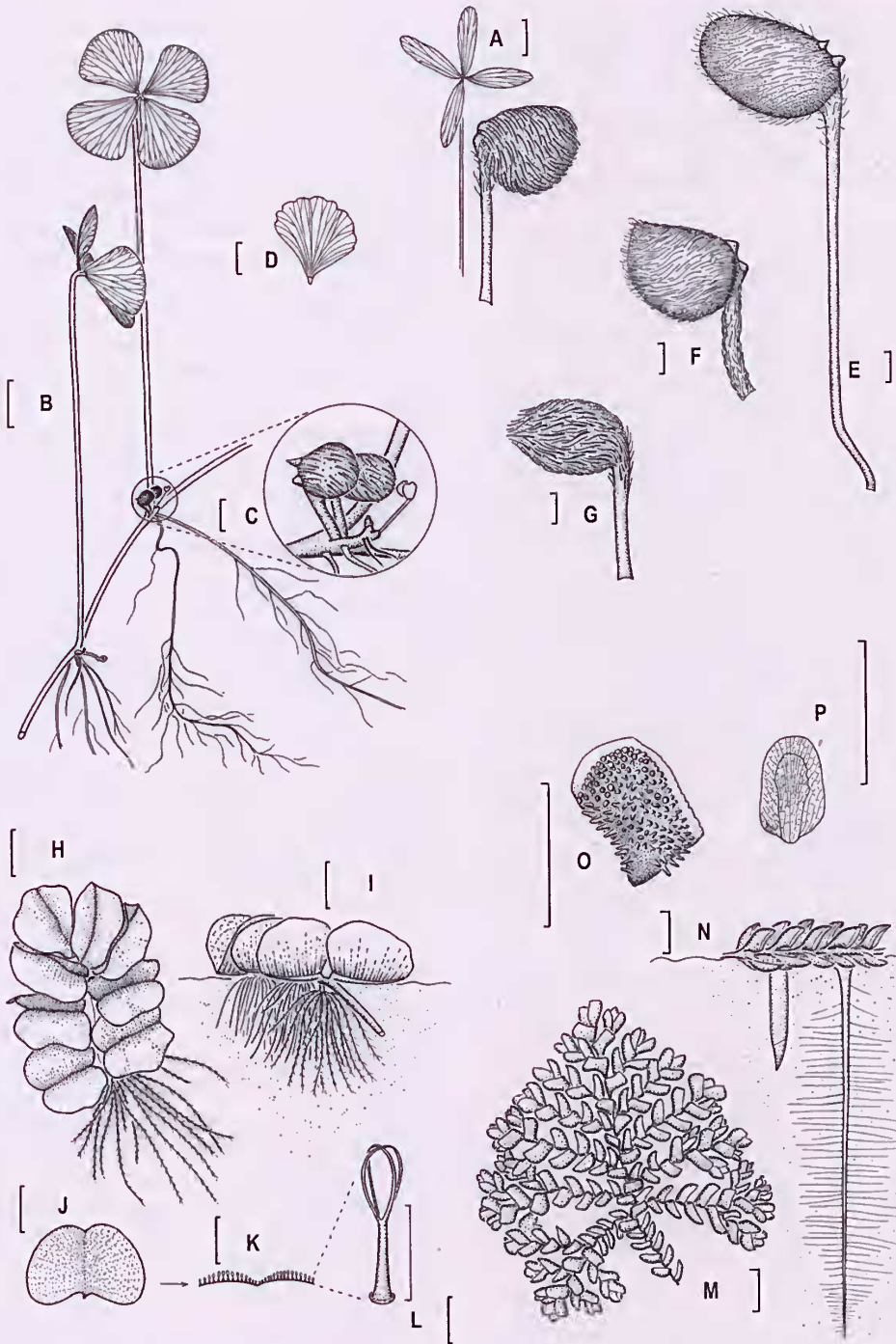


Fig. 7. A. *Marsilea angustifolia*: sporocarp and small leaf (Rankin 2315). B-D. *Marsilea crenata*: B, habit; C, sporocarps; D, leaflet showing crenate margin (B-D, Cowie 7051). E. *Marsilea drummondii*: sporocarp (Cowie 2116). F. *Marsilea hirsuta*: sporocarp (Albrecht 5800). G. *Marsilea mutica*: G, sporocarp (Thomson 1882). H-L. *Salvinia molesta*: H, plan view of a plant floating on water; I, side view of a plant floating on water; J, floating frond; K, transverse section of floating frond showing distribution of hairs; L, hair from the upper surface of a floating frond (H-L, from unvouchered specimen). M-P. *Azolla pinnata*: M, plan view of a plant floating on water; N, side view of a plant floating on water; O, upper lobe of a leaf; P, submerged lobe of leaf (M-P, Wilson DNA 127104). Scale bars: B, H, I = 1 cm, A, C-G, M, N = 2 mm, L, O, P = 1 mm.

Habitat. Usually grows in heavy clay on the floodplains, around lagoons and in *Melaleuca* forest.

Notes. Unlike many taxa the sporocarp morphology is generally distinctive.

***Marsilea drummondii* A. Braun**

(Fig. 7E)

Marsilea drummondii A. Braun, *Linnaea* 25: 721 (1853).

Type: Swan River, W.A., *J. Drummond*; holo: ?B.

Rhizome long-creeping, more or less glabrous to conspicuously hairy, densely hairy at bases of stipes. Stipes 1.5–30 cm long, more or less glabrous or sparsely to densely hairy (at least in part). Leaflets widely obovate to widely depressed obovate, 4–260 mm long, 4–27 mm wide, sparsely to densely hairy, hairs appressed or spreading, margins entire or apically somewhat crenate. Sporocarp 5.5–7 mm long, more or less densely hairy, with hairs removed appearing uniformly dark reddish brown, smooth to ribbed, with 2 teeth, the basal one tending to be longer and broader than the upper and apically rounded, the upper tooth apically somewhat pointed; stalks c.10–100 mm long, commonly 2-times or more the length of the sporocarp but sometimes about the length of the sporocarp. Fertile plants: throughout the year.

Distribution. All mainland states of Australia and particularly widespread in inland areas (p.76).

Habitat. Seasonally wet areas, including northern floodplains and ephemeral swamps and clay pans in the southern regions.

Notes. A highly polymorphic species in regards such features as the degree of hairiness, the length of the fronds, length of the stalk of the sporocarp and the morphology of the sporocarp.

In contrast to some other parts of Australia, there are no records for the N.T. of the sporocarps of this species being used as food by Aboriginal people.

***Marsilea hirsuta* R. Br.**

(Fig. 7F)

Marsilea hirsuta R. Br., *Prodr.* 167 (1810).

Type: Port Jackson Colony and the tropical coast of Australia, *R. Brown*; holo: BM.

M. exarata A. Braun, *Monatsber. Deutsch. Akad. Wiss. Berlin* 732 (1870). **Type:** Brisbane R., Qld, 1855, *F. Mueller*; holo: ?K.

Rhizomes long-creeping, mostly glabrous or sparsely hairy. Stipes 1–28 cm long, glabrous or sparsely hairy. Leaflets widely obovate to widely depressed-obovate or widely cuneate, 1–17 mm long, 2–15 mm wide, more or less glabrous to conspicuously hirsute; hairs appressed or spreading; upper margins entire or apically crenate. Sporocarp 4–6 mm long, mostly manifestly hairy, smooth or faintly to obviously ribbed, with 2 teeth, the basal usually obviously associated with the apex of the stalk; teeth of more

or less equal size and shape or the upper one comparatively broad and apically rounded (but sometimes with an apical mucro) and the lower one narrower, sometimes slightly longer, and often somewhat recurved; stalk shorter than the sporocarps. Fertile plants: Mar.–Dec.

Distribution. Australia, all mainland states and territories, widespread in the N.T. (p.76).

Habitat. Ephemeral depressions, swamps and floodplains and the edge of waterholes and mainly on clay soil.

Notes. One cannot differentiate the two taxa, *M. hirsuta* and *M. exarata*, which are commonly recognised as occurring in the N.T. The range of variation in morphology, particularly of the sporocarp, suggests to us that it is best to consider that the N.T. specimens belong to one polymorphic taxon, and one that is not always readily distinguished from some specimens referred to *M. drummondii*.

No specimens from elsewhere in Australia, nor type specimens of both names, have been examined, leaving the problem as to which name should apply to the N.T. material should they indeed be “good” species, only one of which occurs in the N.T. However, the morphological variation we have observed, plus the fact that distributional data provided in various references show *M. hirsuta* and *M. exarata* to have similar distributions, strongly suggest that throughout Australia, a broader, single-species concept should be used. Thus, the earlier name *M. hirsuta* is adopted here.

***Marsilea latzii* D.L. Jones**

Marsilea latzii D.L. Jones, *Fl. Australia* 48: 707, fig. 56 E, F. (1998).

Type: 9 km E of Rabbit Flat, N.T., 7 July 1980, *P.K. Latz* 8466; holo: DNA; iso: AD, CANB, MEL, SP.

Rhizome much-branched, glabrous except for growing points. Stipes to ca 1 cm long, glabrous or hairy. Leaflets cuneate to widely cuneate, 1–6 mm long, 1–4 mm wide, glabrous or hairy, upper margins entire or irregular. Sporocarp 3–4 mm long, hairy and distinctly ribbed, with an upper prominent tooth and a lower tooth clearly associated with the stalk; stalks 4–6 mm long, unbranched, thin, glabrous. Fertile plants: July.

Distribution. Only known from the Tanami Desert, N.T. (p.76).

Habitat. Grows in sand on the margins of brackish lakes.

Notes. The above description is based on the original description by Jones (1998). It is a diminutive species and in this regard it is like many which are apparently referable to *M. costulifera*. Unlike that species, it is not recorded from clay soils.

***Marsilea mutica* Mett.**

(Fig. 7G)

Marsilea mutica Mett., Ann. Sci. Nat. Bot., sér. 4, 15: 88 (1861).

Type: Lieux inonde a Kanala, New Caledonia, 1855–1860, *Vieillard 1698*; holo: P.

Rhizome long-creeping, mostly glabrous or sparsely hairy but growing points and base of stipes may be densely hairy. Stipes 2.5–30 cm long, glabrous. Leaflets mostly widely obovate to widely depressed obovate but small ones may be obovate, 6–40 mm long, 3–45 mm wide, the distal green part of the leaflet separated from the lower yellowish part by a brownish band, mature leaflets glabrous except for a few hairs at the base of the leaflets, margins entire or apically somewhat erenate. Sporocarp 4.5–6.5 mm long, densely hairy, unribbed, lacking basal teeth; stalks 3–6 mm long, *ca* the length or shorter than the sporocarp. Fertile plants: May–June.

Distribution. New Caledonia and Australia (W.A., N.T., Qld, N.S.W. and seemingly introduced to both Vic. and Tas.) (p.76).

Habitat. Common around lagoons, swamps and billabongs.

Notes. The banding on the leaflets is diagnostic for the species but the feature is only readily apparent in fresh plants growing in water.

***Marsilea* (Neutral Junction entity)**

Rhizome long-creeping, mostly glabrous or sparsely hairy but growing points and base of stipes densely woolly. Stipes to *ca* 15 cm long, glabrous to manifestly hairy. Leaflets cuneate, 10–35 mm long, 10–35 mm wide, the rounded upper margins strongly toothed, immature leaflets densely hairy on undersurface, comparatively sparsely hairy on the upper, mature leaflets glabrous on both surfaces. Sporocarp 2–2.5 mm long, densely woolly, ribbed, lacking basal teeth or with a very slight protuberance above the apex of the stalk; stalks shorter than the sporocarp. Fertile plants: *ca* July.

Distribution. Known only from a single collection, *Albrecht 9192*, gathered 7 km WNW of Claypan Bore, Neutral Junction Station, N.T. (p.76).

Habitat. Recorded as forming monospecific swards in shallow water on a stony claypan.

Notes. The seemingly unique, woolly nature of the indumentum plus the sporocarp morphology suggest that this will prove to be a new taxon.

Salviniaaceae

A monogeneric family.

Reference: Andrews (1990).

***Salvinia* Séguier**

Plants aquatic, free-floating, heterosporous. Rhizomes hairy, lacking true roots. Fronds simple, in whorls of 3, with 2 of each whorl green and floating and 1 submerged and divided into root-like segments.

Sporocarps borne on the submerged leaf, containing either megasporangia or microsporangia or, in some species, both. Spores trilete, chlorophyll absent; microspores minutely rugulose; megaspores perforate.

A genus containing about ten species and widely distributed throughout subtropical and tropical regions of both the Old and New Worlds. Only one species, introduced, in Australia.

***Salvinia molesta* D.S. Mitch.**

(Fig 7H–L)

Salvinia

Salvinia molesta D.S. Mitch., Brit. Fern. Gaz. 10: 251 (1972).

Type: Ruziruhuru River inlet, Lake Kariba, Rhodesia, *D.S. Mitchell 1330*; holo: ?SRGH.

[*S. auriculata* auct. non Aubl.: H.I. Aston, Aquat. Pl. Australia 43–45 (1973).]

Rhizomes branching. Floating fronds shortly stalked, circular or ovate, 0.8–3.5 cm long, 0.5–3.5 cm wide, cordate, apically rounded or emarginate, with a prominent midrib; upper surface covered with stiff, erect hairs, the hairs usually terminating in 4 upwardly curved arms united at their extremities; lower surface with brownish, appressed septate hairs. Submerged frond shortly stalked, much dissected, to *ca* 30 cm long. Sporocarps sterile; microsporocarps many, arranged in 2 rows on segments of the lower frond; megasporocarps several at the base of segments.

Distribution. Apparently native to South America but now widespread in warmer regions of Africa, southern Asia and Australia (W.A., N.T., Qld, N.S.W.) (p.78).

Habitat. Aquatic fern growing on still or slow-flowing water.

Notes. *Salvinia molesta*, a declared noxious weed in the N.T., commonly reproduces by vegetative fragmentation and can rapidly spread to blanket waterways and catchments. Plants do produce sporocarps, and this has been recorded from November to March on herbarium specimens, but spores are sterile and usually visibly deformed.

The species was first recorded in the N.T. in August 1976 when it was found in a pool in a Darwin plant nursery. The following month it was found near Nhulunbuy and more field infestations have been subsequently recorded from localities such as Adelaide River, East Alligator River floodplain, Howard Springs, Girraween Lagoon, Leichhardt Billabong, Magela Creek and Mission Hole (Elizabeth Downs). Some infestations have been eradicated and others are controlled, with variable degrees of success, by chemical, physical and biological methods. Biological control is with the microscopie weevil *Cyrtobagous salviniae*. Adult weevils feed externally upon leaf buds and larvae feed internally on rhizomes. The larvae of three natives

species of pyralid moth also feed on the leaves. A summary of the methods of management of *Salvinia* in the N.T. is provided by Miller and Wilson (1989).

Azollaceae

A monogeneric family.

Reference: Andrews (1990).

Azolla Lam.

Aquatic, free-floating ferns; rhizome flexuose, rooting at nodes. Leaves numerous, 2-lobed; upper lobe thick and photosynthetic and containing blue-green algae in a central cavity; lower lobe submerged and thin and bearing megasporocarps and microsporocarps. Megasporocarps smaller than microsporocarps, each containing a single megaspore. Microsporocarps with usually many microsporangia, each microsporangium containing 4 or more groups (massulae) of microspores; massulae with or without barbed processes.

Azolla contains about six species and the genus is widely distributed throughout tropical to temperate regions of the world. Two species occur in Australia but only *A. pinnata* is in the N.T.

Azolla pinnata R. Br.

(Fig. 7M-P)

Azolla pinnata R. Br., Prod. 167 (1810).

Type: Richmond and Hawkesbury Rivers, *R. Brown Iter Austral.* 134; syn: BM, K, U, MEL; Patterson River, Oct. 1804, *R. Brown Iter Austral.* 135; syn. BM.

Free-floating, regularly branched plants somewhat triangular in outline, to ca 3 cm long; roots of mature plants feathery. Leaves with lobes ca 1 mm long; upper lobe green or reddish, upper surfaces papillate except for the somewhat membranous margins; lower lobe brownish and scale-like. Massulae more or less conical and basally with 1-6 unbarbed processes. Fertile plants: not seen.

Distribution. Asia, New Caledonia, New Guinea, New Zealand and Australia (SA, N.T., Qld, N.S.W., Vic.). In the N.T. confined to the Top End (p.73).

Habitat. A common species in still and slow-moving waters, e.g. at Fogg Dam and floodplains of the Mary and Finniss rivers.

Notes. Plants are usually red or red-brown when growing on open water and greenish in shaded places. They commonly multiply by fragmentation.

Schizaeaceae

A family consisting of two genera with ca 41 species; seven in Australia, three in the N.T.

Reference: Chinnock (1998f).

Key to genera of Schizaeaceae

- 1a. Fertile segments digitately arranged; lamina unbranched *Actinostachys*
- 1b. Fertile segments pinnately arranged; lamina dichotomously branched *Schizaea*

Actinostachys Wall.

Terrestrial. Rhizome short creeping, clothed with simple or multicellular hairs, roots wiry. Fronds simple, dimorphic, flattened or terete. Stipe grading into lamina, indistinct. Sterile lamina undivided; fertile lamina similar to sterile but with apical sporogenous segments. Sporogenous lobes with constriction at point of attachment. Sporangia in 2 or 4 rows, on either side of the vein. Spores ellipsoidal, smooth or with tubercles.

A genus of ca 13 species, two of which are found in Australia, including the N.T.

Key to species of *Actinostachys*

- 1a. Sporangia in four rows, not interspersed with hairs; lamina constricted below sporogenous lobes *A. digitata*
- 1b. Sporangia in two rows, interspersed with brown hairs; lamina not constricted below sporogenous lobes *A. wagneri*

Actinostachys digitata (L.) Wall.

(Fig. 8A, B)

Acrostichum digitatum L., Sp. pl. 2: 1068 (1753).

Schizaea digitata (L.) Sw., Syn. fil. 150, 380, t. 4, fig. 1 (1806).

Actinostachys digitata (L.) Wall., Numer. List, No. 1 (1829).

Type: Sri Lanka, *P. Hermann s.n.*; holo: Herb. P. Hermann 2: 73 (BM 621756).

Rhizome short creeping or suberect, clothed with long stiff glossy pale brown hairs. Fronds clustered, linear-flattened, erect to sinuously erect, grass-like, 8.5-41 cm long, 1.6-4 mm wide; surface smooth, dull to slightly shiny, constricted below sporogenous lobes; midrib prominently raised on one side, margins flat to recurved. Sporogenous lobes 3-18, linear, tufted at apex, 8-54 mm long, to 0.5 mm wide, occasionally with some branches forked distally. Sporangia in four rows. Fertile plants: all year.

Distribution. From Sri Lanka to south-east Asia, northern Australia (W.A., N.T., Qld). In the N.T. it occurs in the Top End north of latitude 15° S and on adjacent offshore islands (p.73).

Habitat. Common in perennial wet rainforests.

Actinostachys wagneri (Selling) C.F. Reed

(Fig. 8C)

Schizaea wagneri Selling, Svensk. Bot. Tidskr. 40: 278 (1946).

Actinostachys wagneri (Selling) C.F. Reed, Bol. Soc. Brot., ser. 2, 21: 131 (1948).

Type: Mt Tjajiak, Manus Is., Admiralty Islands, D.F. Grether and W.H. Wagner 4177; ?holo: S-PA; iso K.

Rhizome short creeping or suberect, clothed with long stiff brown hairs. Fronds clustered, few, weak, linear and channelled when dry, 6-20 cm long, to 0.5 mm diameter, not constricted below sporogenous lobes.

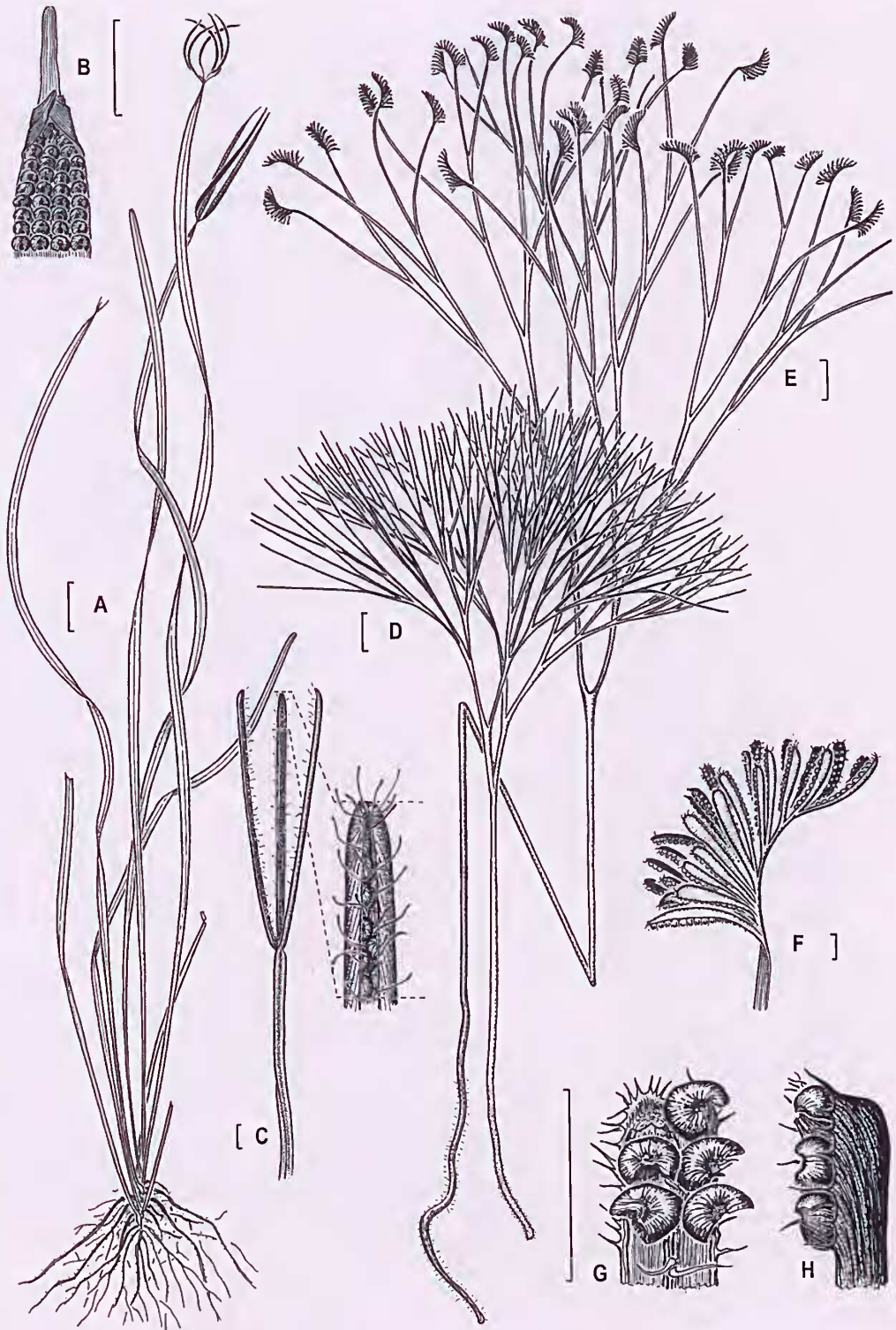


Fig. 8. A, B. *Actinostachys digitata*: A, habit (Michell 1503); B, tip of sporogenous lobe (Dunlop 7540). C. *Actinostachys wagneri*: sporogenous lobes with enlargement showing the tip of a lobe (Russell-Smith 2056). D-H. *Schizaea dichotoma*: D, sterile frond; E, fertile frond; F, sporogenous heads; G, ventral view of the tip of a fertile segment; H, side view of the tip of a fertile segment (D-H, Michell 1559). Scale bars: A, D, E = 1cm, B, C, F-H = 1 mm.

Sporogenous lobes 2–5, linear, tufted at apex, 7–15 mm long, to 0.5 mm wide. Sporangia in two rows, interspersed with long pale brown hairs. Fertile plants: March.

Distribution. Known from only one collection, 12 km N of Paru on Melville Island (p.75). Also in Qld, Malay Peninsula, Indonesia, Papua New Guinea and the Admiralty Islands (p.73).

Habitat. Raised humic soil mounds in perennial spring rainforest.

Notes. The specimen at DNA (*Russell-Smith 2056*) was annotated by David Jones as *Actinostachys wagneri* but is not recorded in the *Flora of Australia* (1998) as occurring in the N.T. It is possible that this species is more common and that its small size and grass-like habit hinder detection in the field.

Schizaea Sm.

Terrestrial. Rhizome short- or long-creeping and clothed with simple or multicellular hairs, roots wiry. Fronds clustered, dimorphic. Stipe grading into lamina, indistinct. Sterile lamina undivided or dichotomously branched once to many times; segments narrow, linear; veins free; fertile lamina similar to sterile but with sporogenous segments borne pinnately or digitately at the apex of lamina axes which are undivided or dichotomously branched, separate or rarely joined by intercostal lamina tissue. Sporangia in two rows, on either side of the vein, fringed by teeth or hairs. Spores ellipsoidal, smooth to variously ornamented.

A genus of *ca* 28 species, with a predominantly tropical distribution. Five species in Australia, one in the N.T.

Schizaea dichotoma (L.) Sm.

(Fig. 8D–H)

Branched comb fern

Acrostichum dichotomum L., Sp. pl. 2: 1068 (1753).

Schizaea dichotoma (L.) Sm., Mém. Acad. Roy. Sci. (Turin) 5: 422 (1793).

Type: China, Herb. Sloan; ?holo: BM.

Schizaea forsteri Spreng., Anleit. 3: 57 (1804); *S. dichotoma* var. *forsteri* (Spreng.) Domin, Biblioth. Bot. 20(85): 207 (1913). **Type:** not located.

Rhizome short-creeping, densely clothed with glossy dark brown hairs. Fronds clustered, or spaced along rhizome, erect, 3.9–61 cm long, seabrid; unbranched portion 1–2 mm wide, subterete, flattened on one side, brown near base, clothed with long brown hairs, green above, hairs scattered; sterile frond shorter than sporogenous frond, dividing above middle into repeated dichotomous branchlets; sporogenous frond similar, but branches more open; sporogenous heads 3–11 mm long, 1–3 times longer than broad; segments 1.5–5 mm long, scabrid. Sporangia mixed with hairs. Fertile plants: all year.

Distribution. Ranges from the Mascarenes to Sri Lanka, south-east Asia, Australia (W.A., N.T., Qld, N.S.W.), New Zealand and islands of the Pacific. In the N.T. it occurs in the Top End, north of latitude 15° S, and extends to adjacent offshore islands (p.78).

Habitat. A common fern mostly associated with margins of perennially wet rainforest, but occasionally found within rainforest. Soils are rich in organic matter.

Lygodiaceae

A monogeneric family consisting of 30 species widespread in the tropics and subtropics. Four species occur in Australia, two in the Darwin region.

References: Andrews (1990), Chinnock (1998g).

Lygodium Sw.

Terrestrial climbing ferns. Rhizome subterranean, short- or long-creeping, dichotomously branched, clothed with septate or multicellular hairs, roots fibrous. Fronds circinnate, exstipulate, clustered along rhizome, dimorphic to trimorphic. Juvenile fronds of definite growth, once-forked into two palmately branched leaflets; climbing fronds with a wiry rachis of indefinite growth formed by unequal dichotomies; the shorter primary rachis branches, alternate, and terminating with a hairy dormant apex, each bearing a pair of pinnate, bipinnate or tripinnate leaves; fertile and sterile leaflets similar or dissimilar; leaflets distinctly stalked or palmatilobate or pinnatilobate, sometimes jointed at base of laminal portion. Sporangia borne separately in two rows on marginal lobes of the fertile leaflets, each near a vein ending and covered with an indusium. Spores tetrahedral-globosc.

A widespread tropical and subtropical genus of *ca* 30 species, with four occurring in Australia and two or perhaps three in the N.T.

Key to species of *Lygodium*

- 1a. Pinnule stalks of similar length *L. microphyllum*
- 1b. Pinnule stalks decreasing in length distally 2
- 2a. Fertile fronds with basal pinnules bipinnate *L. flexuosum*
- 2b. Fertile fronds with basal pinnules tripinnate *L. japonicum*

Chinnock (1998) reported *L. japonicum* from the general Darwin area. Records of this species at DNA indicate that it was collected from the coastal vine forest adjacent to Lameroo Beach, Darwin. It is believed to be a garden escape and is not treated further.

Lygodium flexuosum (L.) Sw.

(Fig. 9A, B)

Ophioglossum flexuosum L., Sp. pl. 2: 1063 (1753).

Lygodium flexuosum (L.) Sw. J. Bot. (Schrader) 1800(2): 106 (1801).

Type: [India]; BM, status not determined.

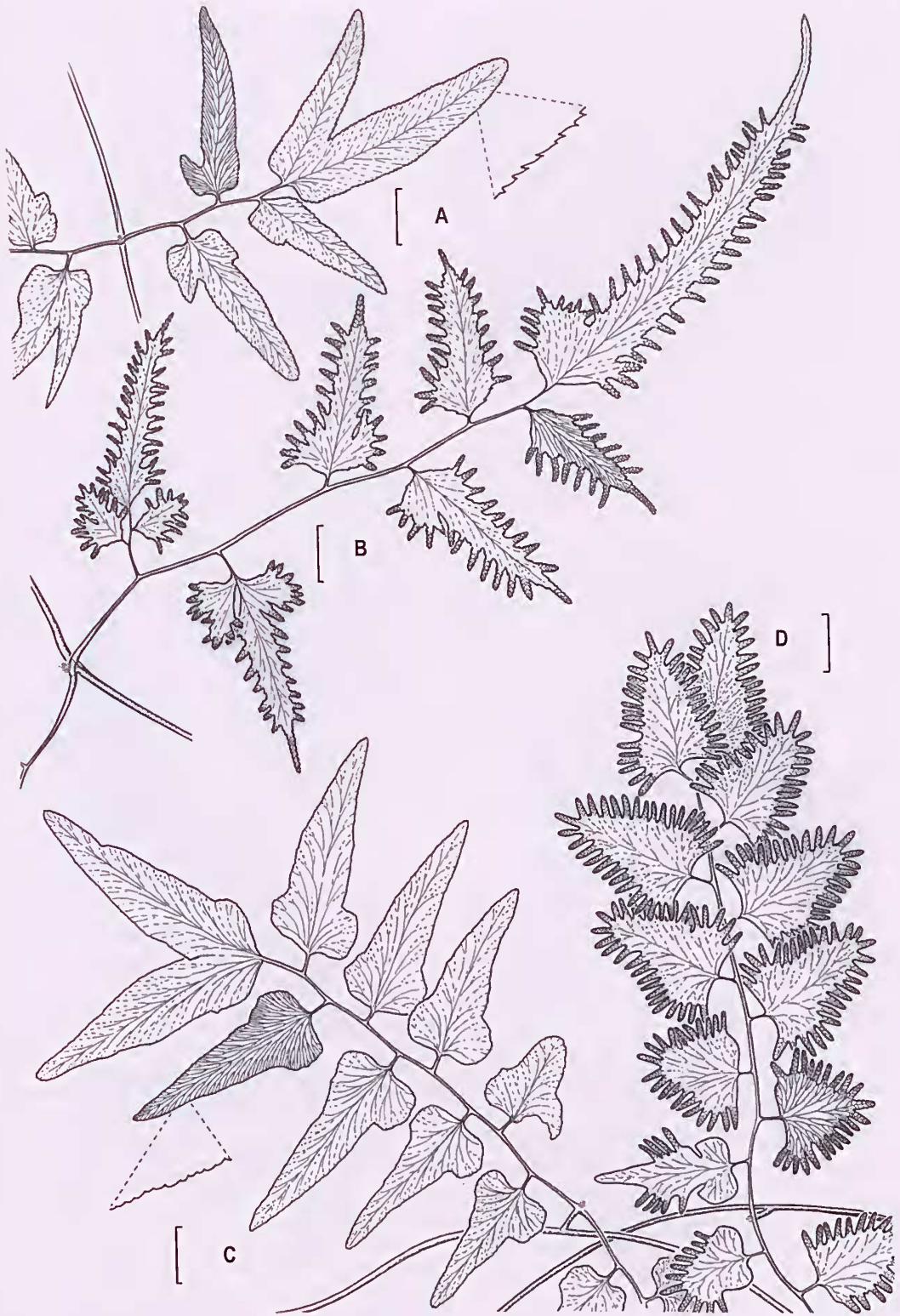


Fig. 9. A, B. *Lygodium flexuosum*: A, sterile frond, with an enlargement showing the margin (Tindale 10056); B, fertile frond (van Oertzen DNA 145121). C, D. *Lygodium microphyllum*: C, sterile frond, with an enlargement showing the margin; D, fertile frond (C, D, Must 1641). Scale bar: A-D = 1 cm.

Ophioglossum scandens L., Sp. pl. 2: 1063 (1753).

Type: [India]; BM, LINN, status not determined.

Lygodium semibipinnatum R. Br., Prodr. 162 (1810).

Type: New Holland, 1803, *R. Brown*; syn: BM; north coast, [Australia], *R. Brown*; syn: K.

Rhizome short-creeping. Juvenile fronds once-forked. Climbing rachis wiry, subterete, flattened on one side with ridged edges, glabrous or sparsely pubescent. Primary rachis branches 0.5–4 mm long. Secondary rachis flattened and winged along upper side; sterile frond pinnate, fertile frond bipinnate at base; petiolules of leaflets decreasing in length distally, with distal leaflets appearing sessile. Basal leaflets of sterile frond palmate with up to seven lobes, lateral leaflets (obscurely) 3-lobed, terminal leaflet (irregularly) palmately lobed. Sterile leaflets 12.5–64 mm long, 4.5–10.5 mm wide, chartaceous; (obliquely) ovate-lanceolate to triangular; base truncate to cuneate; margins serrulate; veins free. Fertile leaflets 8–78 mm long, 9–12 mm wide. Sporogenous lobes 0.5–7.5 mm long. Fertile plants: all year.

Distribution. India, Sri Lanka, Malesia and Australia (W.A., N.T., Qld). In the N.T. common in the Top End north of latitude 16° S (p.76).

Habitat. Associated with monsoon forests on scree slopes close to water.

Lygodium microphyllum (Cav.) R. Br.

(Fig. 9C, D)

Climbing maidenhair

Ugena microphylla Cav., Icon. 6: 76 (1801).

Lygodium microphyllum (Cav.) R. Br. Prodr. 162 (1810).

Type: Luzon, [Philippines], *L. Née*; holo: MA.

Rhizome long-creeping. Juvenile fronds once-forked. Climbing rachis wiry subterete, flattened on one side occasionally with ridged edges, glabrous or sparsely pubescent. Primary rachis branches 1–10 mm long. Secondary rachis flattened and winged along upper side; sterile frond pinnate, fertile frond pinnate, rarely bipinnate at base; petiolules of leaflets of similar length. Basal leaflet of sterile frond 3- or 4-lobed, lateral leaflets (obscurely) 3-lobed, terminal leaflet (irregularly) palmately lobed. Sterile leaflets 9–63 mm long, 4–22 mm wide, membranous to chartaceous; laminal portions deciduous, (obliquely) ovate-lanceolate to triangular; base cordate, truncate to cuneate; margins finely or often obscurely crenulate; veins free. Fertile leaflets 9–55 mm long, 4–22.5 mm wide. Sporogenous lobes 0.5–17.5 mm long. Fertile plants: all year.

Distribution. Tropical Africa, south-east Asia, Malesia and Australia (W.A., N.T., Qld, N.S.W.). In the N.T. it is found north of latitude ca 19° S (p.76).

Habitat. A commonly collected fern associated with wetlands or monsoon vine thickets fringing springs, creeks or rivers.

Notes. Some individuals are dormant over the dry season, persisting by their subterranean rhizomes.

Dennstaedtiaceae

A family with 11 or 12 genera and 190, mostly tropical, species. In Australia 5 genera and 14 species.

References: Andrews (1990), Kramer (1990a), Brownsey (1998).

Key to genera of Dennstaedtiaceae

- 1a. Sporangia in discrete, round or ovate, submarginal sori *Microlepia*
- 1b. Sporangia elongate and more or less continuous along the margins of the lamina 2
- 2a. Fronds leathery, undersurface hairy *Pteridium*
- 2b. Fronds thin, glabrous *Histiopteris*

Histiopteris (J. Agardh) J. Sm.

Plants terrestrial, homosporous. Rhizomes long-creeping, scaly. Fronds monomorphic, 2–4-pinnate, thin, glabrous. Stipe with basal scales. Pinnae sessile, with stipule-like pinnules at the base; veins anastomosing and with a marginal connecting vein. Sori continuous, or almost so, along the marginal connecting vein, paraphyses present; indusium absent, the sori partially covered by the reflexed, membranous margins of the lamina. Spores monolete, tuberculate.

Primarily a pantropical genus but with one species, *H. incisa*, extending to subantarctic islands. With perhaps six to eight species in total but delimitation of taxa is problematic.

Histiopteris incisa (Thunb.) J. Sm.

(Fig. 10A, B)

Bat's wing fern

Pteris incisa Thunb., Prodr. pl. cap. 171 (1800).

Histiopteris incisa (Thunb.) J. Sm., Hist. fil. 295 (1875).

Type: Cape of Good Hope, South Africa, *C.P. Thunberg*; holo: UPS (Herb. Thunberg).

Rhizome creeping and branched, with scales. Fronds erect to arching, to at least 1.5 m long. Stipe and rachis reddish brown in the lower parts, yellowish brown in the upper, glabrous except for a few basal, narrowly triangular scales. Lamina mostly 2-pinnate, may be 3- or 4-pinnate at base, usually discolorous, the upper surface green, the lower glaucous, thin. Pinnae opposite. Pinnules to 65 mm long and 25 mm wide, adnate to midribs, margins entire to lobed, the apices obtuse. Fertile plants: June, Oct.–Dec.

Distribution. Pantropical species extending to southern temperate regions and subantarctic islands (Australia: W.A., N.T., S.A., Qld, N.S.W., Vic., Tas). In the N.T. most records are from the southern region (e.g. Giles Spring, Kings Canyon, Serpentine Gorge, Talipata Gorge), with the only Top End specimens from the vicinity of Twin Falls, Kakadu NP. Not noted as occurring in W.A.

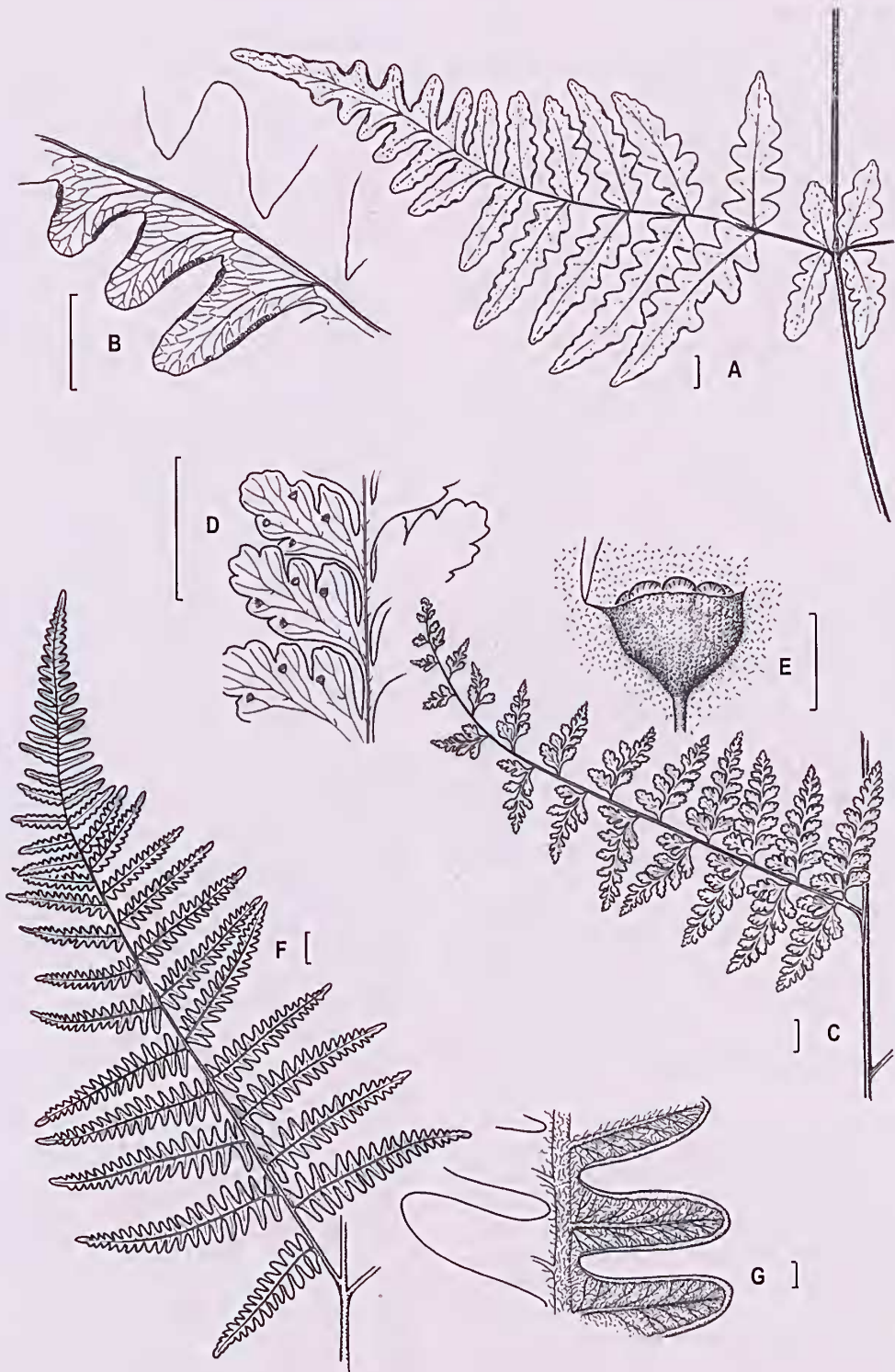


Fig. 10. A, B. *Histiopteris incisa*: A, primary pinna with stipule-like pinnules at the base (Russell-Smith 703); B, part of pinnule showing sori and anastomosing veins (Russell-Smith 5582). C-E. *Microlepia speluncae*: C, primary pinna; D, pinnule showing submarginal sori at end of veins; E, a $\frac{1}{2}$ -cup-shaped sorus with sporangia just visible (C-E, Russell-Smith 5583). F, G. *Pteridium revolutum*: F, primary pinna; G, part of secondary pinna showing venation, hairs and reflexed margin (F, G, Russell-Smith 725). Scale bars: A-D, F = 1 cm, G = 1 mm, E = 0.5 mm.

in the *Flora of Australia* but specimens are held at PERTH (R. Chinnock, *in litt.*) (p.75).

Habitat. Perennially damp gorges and waterholes.

***Microlepia* C. Presl**

Plants terrestrial, homosporous. Rhizomes short-to long-creeping, the young parts with short, uniseriate hairs. Fronds monomorphic, 1–4-pinnate, usually hairy, scales absent; veins free. Sori discrete, ovate or round, submarginal, borne at the vein endings, paraphyses sometimes present; indusium present, ½ cup-shaped, being attached by the base and sides to the lamina. Spores trilete, smooth or echinate.

A genus of *ca* 45 species occurring mainly in warm temperate to tropical regions of the Old World and with most species in Asia. One species native to Australia.

***Microlepia speluncae* (L.) T. Moore**

(Fig. 10C–E)

Polypodium speluncae L., Sp. pl. 2: 1093 (1753).

Microlepia speluncae (L.) T. Moore, Index fil. 93 (1857).

Type: Ceylon.

Rhizome short-creeping. Fronds to at least 1 m long. Stipe yellowish brown, grooved, mostly glabrous. Rachis with an indumentum of uniseriate, septate hairs. Lamina 3-pinnate, both surfaces hairy. Primary pinnae to *ca* 20 cm long. Secondary pinnae to 5.5 cm long. Pinnules ovate, to 12 mm long, 8 mm wide, margins shallowly lobed, obtuse, decurrent, the lowest pinna markedly larger than the one opposite. Sori several on each ultimate segment, borne near the sinuses but distant from the margin, paraphyses present. Fertile plants: *ca* June.

Distribution. Widespread in tropical regions of the world (including the Neotropics where it may be introduced) and in Australia (W.A., N.T., Qld). In the N.T. known only from the Twin Falls region, Kakadu NP (p.76).

Habitat. The only specimen held at DNA was collected from perennial seepage at the base of a rock face.

***Pteridium* Gled. ex Scop.**

Plants terrestrial, homosporous. Rhizomes long-creeping, branched, subterranean, hairy; hairs simple. Fronds monomorphic, 2–4-pinnate, hair present, scales absent; veins forked, free except for a marginal connection; nectaries present at base of pinnae. Sori continuous, or almost so, along the marginal connecting vein, paraphyses absent, the sori partially covered by the reflexed, usually membranous margins of the lamina and sometimes by an inner membranous indusium. Spores trilete, irregularly granulose, lacking a perispore.

Sometimes considered to contain a single, highly variable species, *P. aquilinum*, or several closely related

species. Following Andrews (1990) and Brownsey (1998), three species are recognised as occurring in Australia, with just *P. revolutum* in the N.T.

***Pteridium revolutum* (Blume)**

(Fig. 10F, G)

Hairy bracken

Pteris revoluta Blume, Enum. pl. Javae 214 (1828).

Pteridium revolutum (Blume) Nakai, Bot. Mag. (Tokyo) 39: 109 (1925).

Type: Java.

Stipe and rachis yellow-brown or partly pale chestnut brown, glabrous or with scattered hairs. Fronds to at least 2 m long, stipe usually shorter than the lamina. Lamina 2- or 3-pinnate, lower surface densely hairy, the upper surface glabrous or with scattered hairs. Primary pinnae triangular, to 40 cm long, the midrib prominent and hairy on the undersurface and on the upper surface showing as a distinct groove; hairs of the midrib often reddish brown and coarser than the whitish, almost transparent hairs on the lamina. Secondary pinnae 2.5–15 cm long. Pinnules entire, the membranous reflexed margins with long hairs. Sori linear, submarginal. Indusium membranous, *ca* 0.1–0.2 mm wide, fimbriate. Fertile plants: Nov.

Distribution. India to southern China, New Guinea and Australia (N.T., Qld). In the N.T. it is common in the Top End (p.77).

Habitat. Favouring sandy soils, this plant is commonly found on the edge of rainforests and swamps and in sandstone gorges with a permanent or near-permanent supply of water.

Notes. Fertile plants are rare in this species, Brownsey (1998) not having seen any in Australian material. Only one of the 25 specimens from the N.T. and housed in DNA is fertile.

Lindsaeaceae

Family of perhaps six genera with only *Lindsaea* in Australia.

References: Kramer (1971), Kramer and Tindale (1976), Kramer and McCarthy (1998a).

***Lindsaea* Dryand. ex Sm.**

Ferns terrestrial or epiphytic. Rhizome short- or long-creeping, with coarse, narrow scales. Fronds monomorphic or dimorphic. Lamina 1- or 2-, sometimes 3-pinnate; veins not extending to margins, free or anastomosing. Sori indusiate, terminal on the veins. Indusia short to linear and opening towards the margins, margins entire or irregular.

A genus of *ca* 180–200 species, with most in the Old World tropics and 15 in Australia. Species delimitation is problematic; with the exception of *L. walkerae* the N.T. species seem ill-defined.

Key to species of *Lindsaea*

- 1a. Lamina 2-pinnate for much of its length, ultimate segments always lacking a distinct midvein *L. media*
- 1b. Lamina 1-pinnate or partly 2-pinnate, if partly 2-pinnate then at least some non-terminal segments with distinct midveins 2
- 2a. Veins anastomosing (at least in segments with a distinct midvein) *L. ensifolia*
- 2b. Veins free 3
- 3a. Pinnae linear-elliptic or linear lanceolate *L. walkerae*
- 3b. Pinnae fan-shaped or obovate in outline and symmetric to strongly asymmetric *L. brachypoda*

Lindsaea brachypoda (Baker) Salomon

(Fig. 11A, B)

Davallia brachypoda Baker, Syn. fil. 2nd ed., 468 (1874).*Lindsaea brachypoda* (Baker) Salomon, Nomencl. Gefässkrypt. 212 (1883).**Type:** Gilbert River, Qld, *Daintree*; holo: K.

Rhizomes short-creeping, scales reddish-brown. Fronds ca 3–30 cm long, more or less monomorphic. Stipe yellowish or pale brown. Lamina 1-pinnate; pinnules strongly asymmetrical and fan-shaped to symmetrical and ovate or obovate, 3–15 mm long, 2–9 mm wide, terminal pinna much smaller to larger than the lateral pinnac, the margins entire or shallowly incised; veins free, simple or 1- or 2-forked, no lateral pinnae with a prominent midvein. Sori continuous or interrupted. Spores smooth. Fertile plants: Aug.–May.

Distribution. Australian endemic (N.T., Qld, N.S.W.), within the N.T. all specimens have been collected in the northern region, the most southerly record being from Jasper Gorge (p.75).

Habitat. Commonly found in sandstone rock crevices with a permanent or near-permanent supply of water, be it from seepage or from the splash received from waterfalls.

Notes. As illustrated in Kramer and McCarthy (1998a: fig. 991), the size of the terminal pinna in relation to the lateral pinnac may vary in fronds from the one plant; they may have a very small terminal pinna, with there being a gradual decrease in the size of pinna from the base of the frond to the apex, or the terminal pinna may be at least as large as any of the lateral pinnac, with the lowest pinnac being the smallest of any of the laterals. In several other specimens (e.g. *Russell-Smith* 2280), which are here included under *L. brachypoda*, the terminal pinna may be larger than the lateral pinnac.

Kramer and McCarthy (1998) suggested that a depauperate specimen which they cited (seemingly erroneously) as *Latz* 23493, from the Wessel Islands

may be *L. orbiculata*. No N.T. specimens match the illustration of *L. orbiculata* provided by Kramer (1971: fig. 15). *Latz* 3493B, also a depauperate specimen from the Wessel Islands, and which is presumed to be a duplicate of that cited by Kramer and McCarthy, has some individual fronds which closely match those of *Byrnes* D1307 from Katherine Gorge. These, in turn, seem to link with other forms which are here referred to as *L. brachypoda*.

The species was described by Kramer and Tindale (1976) as having occasional 2-pinnate fronds but no such material from the N.T. is held at DNA.

Lindsaea ensifolia Sw.

(Fig. 11C–F)

Lindsaea ensifolia Sw., J. Bot. (Schrader) 1800 (2): 77 (1801).**Type:** Mauritius, *Anon.*; holo: S.

Rhizomes short- to long-creeping; scales narrowly triangular, to ca 2 mm long, reddish brown. Fronds monomorphic. Stipe 10–35 cm long, usually shorter than the lamina, yellowish to reddish brown. Lamina 15–50 cm long, 1-pinnate or with at least the basal ½ of the frond 2-pinnate; pinnae widely depressed ovate to linear-lanceolate, 7–230 mm long, 7–23 mm wide, barely to markedly reduced in size from the base to the apex of the lamina, margins entire or toothed; midvein prominent in at least some pinnae and the lateral veins anastomosing; often the lower and sometimes most pinnae and pinnules lacking a midvein and with 3 or 4 veins of equal size at the base and these forking and often anastomosing before reaching the apex. Sori continuous but not always extending around the apices of the pinnae; indusium entire, 0.5–1 mm wide, reaching or almost reaching the margin. Fertile plants: throughout the year.

Distribution. Widespread in the Old World tropics, ranging from West Africa to Australia (W.A., N.T., Qld), Hawaii and southern Japan. In the N.T. extremely common in the Top End but also found in the south (p.75).

Habitat. A common fern of rainforest and woodland, growing along stream margins, the edge of springs, seepage areas and in rocky crevices exposed to the spray from waterfalls.

Notes. Two subspecies, i.e. subsp. *agatii* (Brackenr.) Kramer and *L. subsp. ensifolia* Sw., have been recognised as occurring in Australia and both have been recorded for the N.T. Those plants in which the pinnac are mostly or totally undivided and are barely reduced in size from the base to the apex of the frond, and in which the terminal pinna is large, are referable to *L. subsp. ensifolia*. Specimens in which pinnae markedly reduce in size from the base to the apex, have a small terminal pinna, and in which the lamina are basally 2-pinnate are referable to *L. subsp. agatii*.



Fig. 11. A, B. *Lindsaea brachypoda*: A, frond; B, pinna showing veins and sori (A, B, Russell-Smith 3932). C-F. *Lindsaea ensifolia*: fronds from three variants plus a pinna from one morph showing anastomosing venation, C (Henshall 3819), D, E (Latz 2903), F (Brennan 2687). G, H. *Lindsaea media*: G, frond; H, pinnales showing continual sori (G, H, Russell-Smith 3007). I, J. *Lindsaea walkerae*: I, frond; J, pinna showing free, forking venation (I, J, Russell-Smith 5759). Scale bars: A, C, D, F, G, I = 1 cm, E, J = 2 mm, B, H = 1 mm.

However, intermediate specimens (e.g. *Cowie 2055*) are common and the maintenance of infraspecific taxa seems untenable in this highly variable taxon.

Ethnobotany. Some Aboriginal people are believed to eat the rhizome and possibly other parts of the plant (Wightman and Smith 1999).

***Lindsaea media* R. Br.**

(Fig. 11G, H)

Lindsaea media R. Br., Prodr. 156 (1810).

Type: Island G2, north coast of Australia, 18–24 Feb. 1803, *R. Brown Iter Austral.* 82; holo: BM; iso: E, K, ?P, ?U.

Rhizome creeping; scales *ca* 1 mm long, yellow. Fronds monomorphic, to *ca* 60 cm long. Stipes yellowish or pale brown. Lamina 2-pinnate for usually at least $\frac{1}{2}$ of its length, to *ca* 30 cm long; pinnae reducing in size towards the apex of the frond, the largest to 2–8 cm long; pinnules subsessile, fan-shaped or subrhombic, 5–16 mm long, 3–11 mm wide, entire or toothed; prominent midvein absent, veins free and 1–3-forked or irregularly anastomosing. Sori continuous except at marginal incisions; indusium reaching to or slightly exceeding the margin, variably incised. Fertile plants: July–Feb.

Distribution. New Guinea and Australia (N.T., Qld). In the N.T. all specimens are from NE Arnhem Land (p.75).

Habitat. A species of riparian forest and sandstone areas with permanent seepage.

***Lindsaea walkerae* Hook.**

(Fig. 11I, J)

Lindsaea walkerae Hook., Sp. fil. 1: 219, pl. 69A (1846).

Type: Ceylon, *Mrs Walker*; holo K; iso: B.

Rhizome short- to long-creeping; scales narrow, to 1.5 mm long, reddish brown. Fronds monomorphic. Stipes dark reddish brown to almost black. Lamina 1-pinnate, to 80 cm long, with 6–19 lateral, opposite or alternate pinnae; pinnae sessile or very shortly stalked, linear-lanceolate or linear-elliptic, margins entire and slightly revolute, 15–110 mm long, 4–10 mm wide, firm; prominent midvein present, lateral veins free, closely spaced, 1–3-forked. Sori usually continuous along the margins and mostly extending around the apices of the pinnae; indusium 0.4–0.6 mm wide, entire. Fertile plants: May, June, Oct.

Distribution. Sri Lanka east to New Guinea, Micronesia and northern Australia (N.T., Qld). In the N.T. only known from Bathurst and Melville islands and from near Lake Evella in eastern Arnhem Land (p.75).

Habitat. Mostly collected from the margins of spring jungle but also recorded from a peaty swamp on Bathurst Island.

Pteridaceae

A cosmopolitan family with five genera and *ca* 300 species. In Australia 12 species and two genera, *Acrostichum* and *Pteris*. Sometimes given a much broader circumscription to encompass, for example, the members of Adiantaceae.

Reference: Kramer and McCarthy (1998b).

Key to genera of Pteridaceae

- 1a. Sporangia covering the undersurface of fertile pinnae *Acrostichum*
- 1b. Sporangia in elongate, submarginal sori which are protected by a recurved pinna margin *Pteris*

***Acrostichum* L.**

Plants terrestrial. Rhizome creeping or erect, thick, with fleshy prop roots. Fronds to *ca* 3 m tall; stipe shorter than the lamina, with basal scales; lamina 1-pinnate (but juvenile fronds simple), leathery, the pinnae mostly stalked but the upper ones may be sessile, the upper pinnae fertile and generally smaller than the lower sterile ones, veins reticulate. Sori absent, the sporangia covering the undersurface of the fertile pinnae. Spores tetrahedral.

A pantropical genus with three species, two of which occur in Australia.

Key to species of *Acrostichum*

- 1a. Sterile pinnae with truncate, rounded, or sometimes slightly bilobed apices and usually with a short abrupt point *A. aureum*
- 1b. Sterile pinnae with at least some acute to acuminate apices *A. speciosum*

***Acrostichum aureum* L.**

Acrostichum aureum L., Sp. pl. 2: 1069 (1753).

Type: Jamaica and Dominica; LINN.

Fronds to *ca* 2 m tall, in clumps; juvenile fronds not seen. Sterile pinnae linear or linear-lanceolate, 18–45 cm long, 3.5–7.5 cm wide, more or less abruptly rounded, truncate or rarely bilobed at the apex but with a small point. Fertile pinnae with the lamina somewhat linear, 15–22 cm long, 1.5–3 cm wide, basally asymmetric, apically truncate but with a short point. Fertile fronds: *ca* Nov.

Distribution. Generally regarded as a pantropical species which in Australia is found in the N.T. and Qld. In the N.T. it is only known from a few sites in the north (p.73).

Habitat. The only specimens that seem to be of this taxon are from freshwater (e.g. rainforest on the edge of a black soil floodplain at Kemp Airstrip and freshwater seepage at the Adelaide River crossing on the Arnhem Highway) and brackish water such as on the edge of the Habgood River.

Notes. Almost all specimens of this genus held at DNA are seemingly *A. speciosum*. Very few, following Holttum (1954) and Kramer and McCarthy (1998) and

as often determined by Kramer, are referable to *A. aureum* by virtue of their sterile pinnae with truncate to bilobed apices with a short central point. Apart from this character there is no absolute feature on DNA specimens that seems to distinguish the two taxa. Rhizome scales, said to be to 40 mm long in *A. aureum* and less than 10 mm long in *A. speciosum*, are lacking from almost all specimens.

Although using the shape of the apices to distinguish taxa it must also be said that there is a gradation from obtuse to acuminate between specimens and to some extent within single plants; e.g. *Dunlop 9236* has pinnae with obtuse and acute apices and *Russell-Smith 5873* has pinnae with acute apices and truncate apices. Thus several specimens with truncate apices here referred to *A. aureum* can be viewed as nothing more than extremes in that variation. Specimens referred to *A. aureum* always have some pinnae more than 4 cm wide but so do some which are otherwise seemingly best placed in *A. speciosum*.

Kramer and McCarthy (1998) noted that it is not clear whether intermediates that "occur sparingly" between the two species "are of hybrid origin or extreme atypical plants of one or the other". The question must be asked whether two "good" species are actually involved. Disconcertingly, Holttum (1954) recorded that juvenile fronds of *A. aureum* are strap-shaped but Andrews (1990) recorded that in Queensland material they are the same shape, lanceolate, as in *A. speciosum*. The lamina of the juveniles is always ovate to lanceolate in outline in the few specimens of *Acrostichum* held at DNA. Clearly, species circumscription and the application of names in *Acrostichum* requires further investigation.

A common name of "golden mangrove fern" is sometimes applied to this species (c.g. Kramer and McCarthy 1998) but given that the N.T. specimens are not associated with mangrove communities, this seems a particularly inapt name.

Acrostichum speciosum Willd.

(Fig. 12A, B)

Mangrove fern

Acrostichum speciosum Willd., Sp. pl. 5: 117 (1810).

Type: India Orientali; holo: B (herb. Willdenow).

Fronds to ca 1.5 m tall, in clumps. Sterile pinnae elliptic to narrowly elliptic or ovate to lanceolate, 5–40 cm long, 1.8–5.5 cm wide, gradually to somewhat abruptly tapering to an acute to acuminate apex. Fertile pinnae with the lamina lanceolate, 7–16 cm long, 1–2.5 cm wide, apex acute to acuminate. Fertile fronds: throughout the year.

Distribution. Tropical Asia and Australia (W.A., N.T., Qld, N.S.W.) (p.73).

Habitat. A mostly coastal species associated with mangroves and areas regularly inundated by saltwater, occasionally on inland springs.

Ethnobotany. Some Aboriginal people eat parts of the plant for sustenance (Wightman and Smith 1999).

Pteris L.

Plants terrestrial. Rhizome creeping or erect, commonly stout, prop roots usually absent. Fronds monomorphic or dimorphic, to ca 1 m or more tall; stipe straw-coloured, reddish-brown or brown, with basal scales few to many; lamina 1–4-pinnate-pinnatifid, somewhat thin or leathery, glabrous or with some uniseriate hairs, the pinnae not or barely stalked, veins free or anastomosing. Sporangia in elongate, submarginal, mostly continual sori which are protected by a recurved pinna margin; paraphyses absent or present. Spores bilateral or tetrahedral, surfaces smooth or sculptured.

A genus of more than 240 species in temperate and tropical regions of the world. In Australia ten species are recognised, two of which are introduced. In the N.T. there are perhaps three species, *P. tremula*, *P. vittata* and *P. tripartita*.

Key to species of *Pteris*

- 1a. Fronds 1-pinnate *P. vittata*
- 1b. Fronds 2- or 3-divided 2
- 2a. Veins near costae anastomosing; lamina dark green *P. comans*
- 2b. Veins free, simple or once- or twice-forked; lamina pale green *P. tremula*

Pteris comans G. Forst.

(Fig. 12C, D)

Netted brake

Pteris comans G. Forst., Fl. ins. austr. 79 (1786).

Type: New Zealand.

Terrestrial fern with the upper part of the lamina with sessile pinnae, the individual pinnae deeply pinnatifid. Rachis grooved, yellowish, with scattered uniseriate, eglandular hairs. Ultimate segments somewhat oblong and falcate, 12–30 mm long, 4–5 mm wide, the lower margins entire, the upper margins crenate, sometimes with lobes in the lower half; lower side of upper pinnae decurrent on the rachis; terminal segment of pinnae gradually extending to a point; veins anastomosing near the midrib.

Distribution. Australia (N.T., Qld, N.S.W., Vic., Tas.), New Zealand and islands of the south Pacific. In the N.T. it is known by a single collection from Aquarium Springs Gorge, Woollogorang Station (p.77).

Habitat. The only known specimen was growing in a seepage area at the base of a cliff.

Notes. The single specimen, *Trainor 156*, of this species which is held at DNA is sterile, but nonetheless seems referable to this species rather than *P. tripartita*, being in accord with the illustration and description included in Andrews (1990: 300, fig. 30.2B). Due to the paucity of material the above description is necessarily brief.

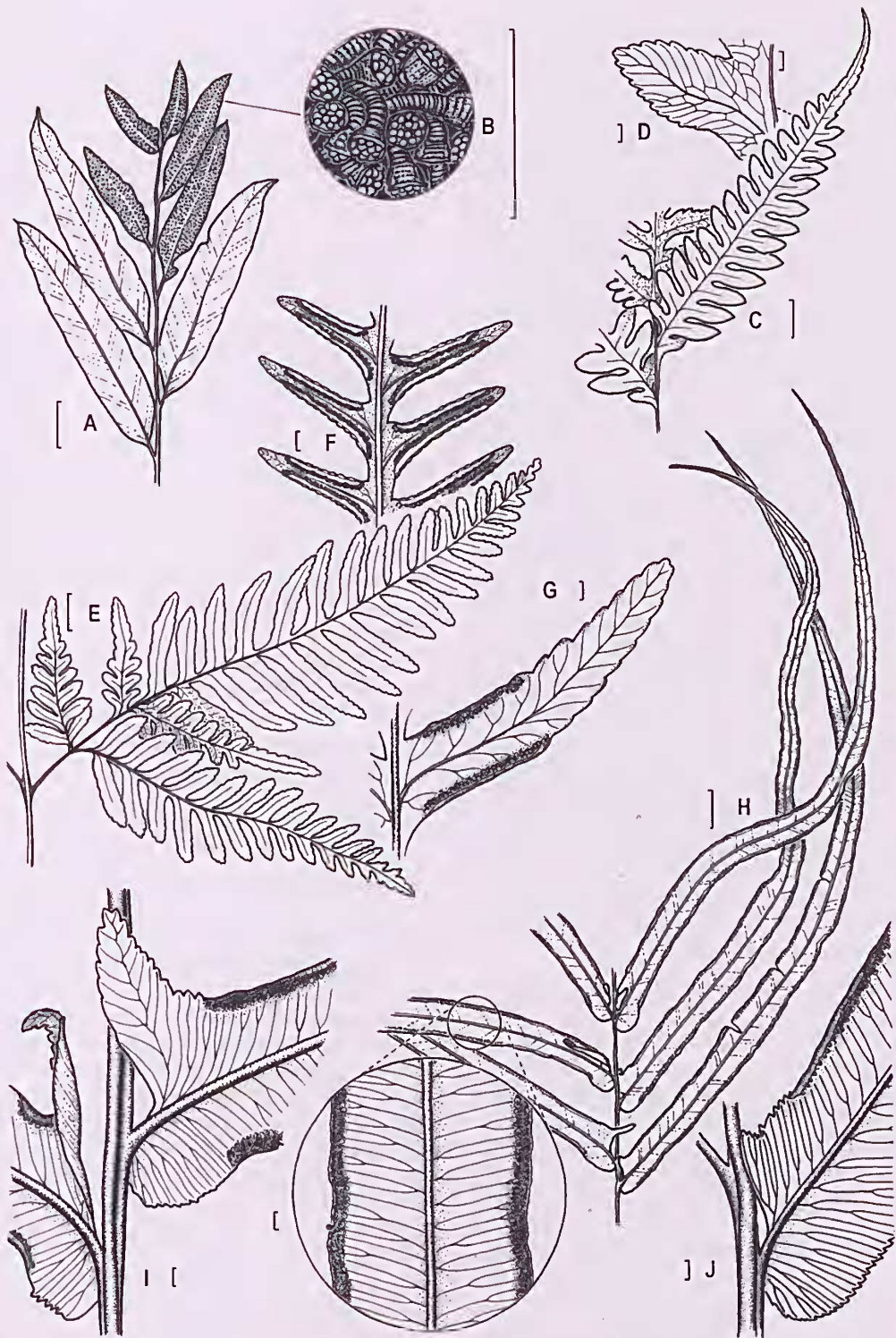


Fig. 12. A, B. *Acrostichum speciosum*: A, upper part of frond showing sterile and fertile pinnae; B, sporangia on lower surface of pinna (A, B, Thomson 2774). C, D. *Pteris comans*: C, upper pinna; D, pinnule (C, D, Trainor 156). E-G. *Pteris tremula*: E, base of frond; F, lower surface of fertile ultimate segments with entire margins (E, F, Latz 6311); G, lower surface of partly fertile ultimate segment with toothed margins (Henshall 2856). H-J. *Pteris vittata*: H, part of frond, including detail of venation; I, base of middle pinnule; J, base of upper pinnule (H-J, Barritt 1236). Scale bars: A = 4 cm, C, E, H = 1 cm, B, D, F, G, I, J = 1 mm.

***Pteris tremula* R. Br.**

(Fig. 12E–G)

Tender brakefern

Pteris tremula R. Br., Prodr. 154 (1810).

Type: Port Jackson, R. Brown.

Rhizome short, creeping, with numerous pale brown scales. Fronds dimorphic, tufted, to ca 120 cm or more long. Stipe to ca 60 cm or more long, reddish brown, grooved, with or without a few basal scales; scales narrowly triangular, ca 2 mm long, pale brown. Lamina 3-pinnate for most of its length, to ca 60 cm or more long and perhaps ca 40 cm wide. Rachis glabrous. Pinnae decreasing in size from the base to the apex, the largest pinnae ca 30 cm long, 9 cm wide, costae often conspicuously grooved on the upper surface; ultimate segments to ca 3 cm long, ca 0.5 cm wide and with toothed margins and infertile or fertile or the segments to ca 1.5 cm long, 0.2 cm wide and with entire margins and always fertile; veins at ca 45° to the costa, free, not or once- or twice-forked. Sori continual from the base to or almost to the apex of the ultimate segments or disrupted at the sinuses in those with toothed margins; paraphyses absent. Fertile: May–Dec.

Distribution. Australia (N.T., S.A., Qld, N.S.W., A.C.T., Vic., Tas.) to New Zealand, Kermadec Islands, Lord Howe Island, Norfolk Island and Fiji. In the N.T. restricted to the southern region, e.g. Standley Chasm, Mt Giles and Kings Canyon (p.77).

Habitat. On the margins of springs and in permanently wet seepage areas in sheltered gorges.

Note. A variable species, often said to have dimorphic fronds, implying that fertile and sterile fronds are morphologically different but in some specimens it is evident that fronds with broad ultimate segments may produce sori, not just those with narrow segments.

***Pteris vittata* L.**

(Fig. 12H–J)

Ladder brake, Chinese brake

Pteris vittata L., Sp. pl. 2: 1074 (1753).

Type: China, *P. Osbeck*; lecto: LINN 1246.3, *fide* R. Tryon, Contr. Gray Herb. 194: 191 (1964).

Rhizome short, creeping, with numerous scales. Fronds monomorphic, arching, to ca 1.5 m long. Stipe to ca 25 cm or more long, pale brown, grooved, with a dense cover of scales at the base; scales narrowly triangular, 4–12 mm long, yellowish-brown or brown. Lamina 1-pinnate, to ca 80 cm or more long and perhaps ca 40 cm wide. Rachis with scattered hairs. Pinnae decreasing in length from the upper part of the lamina to the base of the lamina although the uppermost pinnae also shorter than the mid-pinnae and the terminal pinna also very long, the largest pinnae ca 25 cm long, 1 cm wide and tapering to the apex, the lowest basal pinna ca 3.5 cm long, ca 0.7 cm wide, all pinnae with the margins serrate in sterile zones; bases of pinnae often

asymmetrical and often slightly overlying the rachis, the mid-pinnae sometimes with a basal aroscopic lobe to 15 mm long; veins nearly at right-angles to the costa, free, once-forked. Sori linear, continual from near the base and for most of the length of the pinna; paraphyses abundant. Fertile: May.

Distribution. Temperate to tropical regions of the Old World (Australia: W.A., N.T., Qld, N.S.W., Vic.). In the N.T. known only from the Fitzmaurice River gorge and Matt Wilson Creek (p.78).

Habitat. Sheltered areas in sandstone country with permanent water.

Notes. Except for the aroscopic lobes on the mid-pinnae of *Barritt 1236*, the specimens seem to fit within the circumscription of *P. vittata* as illustrated and described by Kramer and McCarthy (1998).

Adiantaceae

The Adiantaceae are sometimes treated as a monogeneric family and have also been treated as part of the Pteridaceae. Following Bostock in *Flora of Australia*, the Adiantaceae are treated here as a cosmopolitan family with 28 genera and ca 600 species, of which eight genera and about 36 species occur in Australia.

References: Andrews (1990), Tryon (1990), Bostock (1998a).

Key to genera of Adiantaceae

- 1a. Rhizomes with bristles only *Taenitis*
- 1b. Rhizomes with scales and sometimes also with hairs 2
- 2a. Sori borne on reflexed flap of lamina *Adiantum*
- 2b. Sori not borne on a marginal flap (but may be covered by lamina margin) 3
- 3a. Sporangia away from the margins and borne along the length of the veins; undersurface of frond white *Pityrogramma*
- 3b. Sporangia in marginal or nearly marginal sori; undersurface of fronds never white 4
- 4a. Sori concealed by toothed scales . *Paraceterach*
- 4b. Sori not concealed by scales 5
- 5a. Primary frond division palmate; minor veins obscure *Doryopteris*
- 5b. Primary frond division pinnate; minor veins visible *Cheilanthes*

***Adiantum* L.**

Maidenhair ferns

Ferns terrestrial. Rhizome prostrate and creeping or erect, commonly branched, with basally attached scales. Fronds monomorphic or almost so. Stipes shiny, brown or black, with basal scales as on rhizome. Lamina 1–5-pinnate, pinnately decompound or helicoid, membranous to leathery, glabrous or hairy, sometimes glaucous. Pinnules commonly fan- or somewhat

diamond-shaped; veins usually free or sometimes anastomosing, ending at or near the margins. Sori on the lower surface of the reflexed lamina margins which form a false indusium or soral flap. Sporangia borne along the terminal part of the veins; paraphyses present or absent. Spores trilete, tetrahedral to globose, with 32 or 64 per sporangium.

Cosmopolitan genus with *ca* 150 species, with eight in Australia and five in the N.T.

Reference: Bostock (1998a).

Key to species of *Adiantum*

- 1a. Lamina 1-pinnate 2
- 1b. Lamina 2–5-pinnate 3
- 2a. Pinnules glabrous *A. philippense*
- 2b. Pinnules beset with single-celled, dark hairs
..... *A. diaphanum*
- 3a. Pinnules mostly asymmetrical at base and
subtrapeziform *A. hispidulum*
- 3b. Pinnules mostly symmetrical at base, shallowly
obdeltate to obtriangular or widely depressed
obovate to obovate 4
- 4a. Outer margins of pinnules shallowly lobed; soral
flaps notched at the junction with the pinnule
margin *A. atroviride*
- 4b. Outer margins of pinnules manifestly cleft; soral
flaps not indented into the pinnule margin
..... *A. capillus-veneris*

Adiantum atroviride Bostock

(Fig. 13A, B)

Adiantum atroviride Bostock, Fl. Australia 48: 707, fig. 104, B–D (1998).

Type: Manning River, 22.5 km NNW of Gloucester, N.S.W., *R. Coveny* 6401, *P. Hind* and *P. Phillips*; holo: NSW; iso: BRI.

Rhizome erect or shortly creeping; scales numerous, narrowly triangular, 1.5–3 mm long, brown, the margins shortly ciliate. Fronds to *ca* 55 cm; stipe dark reddish or purplish brown, shiny, glabrous or with a few scales at the base. Lamina 2–4-pinnate, pale green. Pinnules very widely obovate to obovate, symmetric or somewhat asymmetric at the base, 5–14 mm long, 3–14 mm wide, glabrous, distally with 2–6 shallow lobes; veins conspicuous, free, mostly 2- or 3-forked; stalks reddish-brown except for whitish base, 1–8 mm long. Sori 2–7 on distal margins of each pinna; soral flaps reniform, 0.9–1.3 mm across longest axis, occurring at the base of a sinus on the margin of the pinnule, glabrous. Fertile plants: *ca* Aug.–Nov.

Distribution. Australia (N.T., Qld, N.S.W.) and Lord Howe Island. In the N.T. only known from near Mirringatja and Ramingining in north-central Arnhem Land (p.73).

Habitat. Recorded as a ground fern of semi-deciduous vine forest and from spring jungle in a sandstone gorge.

Notes. Bostock (1998a) noted that the N.T. and north Qld specimens included in this species belong to a distinct taxon which “almost certainly warrants separation at least at a varietal or subspecific level”.

Adiantum capillus-veneris L.

(Fig. 13C, D)

Adiantum capillus-veneris L., Sp. pl. 2: 1096 (1753).

Type: locality unknown, *Magnol s.n.*; lecto: LINN No. 1252.9, *fide* Pic.Serm., *Webbia* 12: 678 (1957).

Rhizome creeping; scales dense, elongate, yellow-brown, margins entire. Fronds to *ca* 30 cm; stipe slender, dark reddish brown, shiny, glabrous except for a few scales near the base. Lamina usually 2- or 3-pinnate, pale green, glabrous. Pinnules shallowly obdeltate to obtriangular or widely depressed obovate to obovate, 5–22 mm long, 6–25 mm wide, distally deeply lobed and at least in sterile specimens coarsely denticulate; veins reddish-brown at base but otherwise conspicuous but pale; stalks reddish-brown, 1–7 mm long, not basally articulated. Sori *ca* 3–11 on distal margins of each pinna; soral flaps somewhat oblong and 0.8–1.2 mm long, not or barely indented on the lamina margin, glabrous. Fertile plants: Mar.–May.

Distribution. A widely distributed species in warm to tropical parts of the world. In Australia it is known from all States and Territories except Tasmania. Within the N.T. it is only known from three localities, *i.e.* Hugh Gorge in the south and Jasper Gorge and Matt Wilson Creek in the Victoria River district (p.73).

Habitat. Seepage areas on cliff faces and along water courses in sheltered rocky gorges.

Notes. The specimen from Jasper Gorge is depauperate and some fronds consist of the equivalent of a single pinnule in larger specimens.

Adiantum diaphanum Blume

Adiantum diaphanum Blume, Enum. pl. Javae 215 (1828).

Type: Linga Jattie, Java, *C.L. Blume* 649; holo: L.

Rhizome erect; scales narrowly- to linear-triangular, brown, to *ca* 1.5 mm long, margins entire. Fronds to *ca* 12 cm or more long; stipe and rachis reddish-brown, glabrous or with occasional stiff, reddish-brown hairs. Lamina 1-pinnate, not proliferous. Pinnules asymmetric, somewhat rectangular or trapeziform, 4–12 mm long, 2–5 mm wide, distally shallowly lobed or denticulate, with dark, reddish-brown, stiff, pointed hairs scattered over the surface; veins conspicuous, free, mostly 2- or 3-forked; stalks to 2 mm long, barely articulated to rachis. Sori *ca* 2–5 per pinna; soral flaps reniform, 0.7–1.1 mm across longest axis, occurring at the base of a sinus on the margin of the pinnule, setose. Fertile plants: *ca* Oct.

Distribution. Taiwan and Japan to Malesia, Australia (N.T., Qld, N.S.W., Vic.), New Zealand and

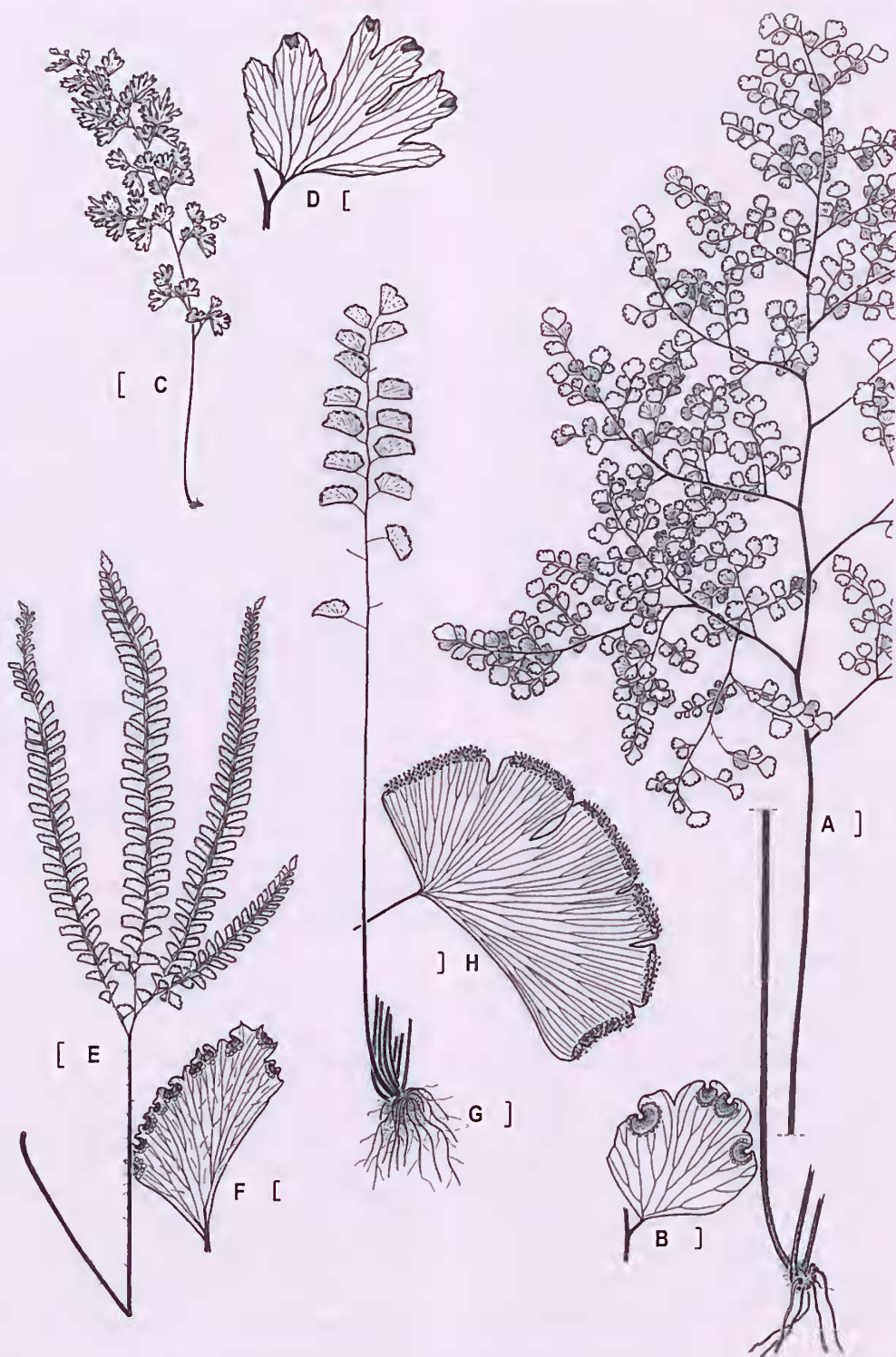


Fig. 13. A, B. *Adiantum atroviride*: A, frond and rhizome; B, fertile pinna (A, B, Scarlett 233). C, D. *Adiantum capillus-veneris*: C, frond; D, fertile pinna (C, D, Cowie 9178). E, F. *Adiantum hispidulum* var. *hispidulum*: E, frond; F, fertile pinna (E, F, Russell-Smith 5080). G, H. *Adiantum philippense*: G, frond and rhizome; H, fertile pinna (G, H, Russell-Smith 3187). Scale bars: A, C, E, G = 1 cm, B, D, F, H = 1 mm.

Pacific Islands, as far east as Fiji. In the N.T. only known from a single collection (*Harwood 531*) collected south of Wologorang homestead (p.73).

Habitat. The only specimen was obtained from around a rock pool at the base of a cliff face.

Notes. Bostock (1998a) recorded that fronds may sometimes be 2- or 3-pinnate at the base.

Adiantum hispidulum Sw. var. *hispidulum*

(Fig. 13E, F)

Adiantum hispidulum Sw., J. Bot. (Schrader) 1800(2): 82 (1801) var. *hispidulum*.

Type: Australia; holotype: S.

[*A. pubescens* auct. non Schkuhr: Dunlop (ed.), Checklist Vasc. Pl. Northern Terr. 1 (1987).]

Rhizome shortly creeping, stoloniferous; scales brown, margins entire. Fronds to ca 55 cm; stipe and rachis dark reddish or purplish brown, glabrous or more commonly with an obvious indumentum of antrorse reddish brown hairs, the rachis often with some basal scales. Lamina 2- or 3-pinnate. Pinnules symmetric and tending to be obovate or obtriangular at the base of the lamina but most manifestly asymmetric at their base and the whole subtrapeziform, 8–15 (27) mm long, 3–8 mm wide, distally dentate or shallowly lobed, glabrous or more commonly with an indumentum of scattered, often erect hairs; veins conspicuous, mostly 2- or 3-forked; stalks to ca 1 mm long. Sori to ca 14 on distal margins of each pinna; soral flaps subcircular, 0.8–1.1 mm across longest axis, occurring at the base of a sinus on the margin of the pinnule, with erect, brown setae. Fertile plants: throughout the year.

Distribution. Africa, Asia, all states and territories of mainland Australia, New Zealand and east to Polynesia. Widespread in the N.T. (p.73).

Habitat. Occurs in a wide range of habitats, from rock faces permanently damp from seepage to riparian, evergreen vine forest.

Notes. In recognising four varieties of the species within Australia, Bostock (1998a) noted that they represent “extremes of a myriad of mutations and intergrades”.

Adiantum philippense L.

(Fig. 13G, H)

Adiantum philippense L., Sp. pl. 2: 1094 (1753).

Type: illustration, Petiver, *Gazophyll. Nat. t. 4, fig. 4* (1702).

Rhizome short-creeping, suberect to erect; scales narrowly- to linear-triangular, reddish brown, 1–2.5 mm long, margins entire or barely toothed. Fronds to ca 45 cm long; stipe and rachis reddish-brown, glabrous. Lamina 1-pinnate, sometimes with proliferous buds. Pinnules asymmetric, mostly somewhat rectangular or trapeziform but smallest ones may be almost obovate, 4.5–30 mm long, 3–13 mm wide, distally shallowly lobed, glabrous; veins

conspicuous, free, mostly 1–3-forked; stalks 2–12 mm long, articulated to rachis. Sori 2–8 per pinna; soral flaps oblong, 2–9 mm long, occupying the entire outer margin of the lobe, glabrous. Fertile plants: throughout the year.

Distribution. Tropical regions from Africa to Polynesia, in Australia in W.A., N.T. and Qld (p.73).

Habitat. A common species in perennially wet, shaded areas of monsoon forest and often in sandstone areas but also, for example, found at the shaded entrances of limestone caves and potholes.

Cheilanthes Sw.

Rock ferns

Terrestrial ferns. Rhizome short-creeping, with scales. Fronds monomorphic or sometimes dimorphic, erect or spreading. Stipes tufted, shiny, brown or black. Lamina 1–4-pinnate at base, glabrous or hairy or with scales; pinnae up to 14 pairs. Pinnules short-stalked or sessile, glabrous or with hairs or scales; veins usually free. Sori discrete or continuous, marginal and often protected by the inrolled margins of the lamina. Spores tetrahedral to globose, ornamented, with 16 or 32 per sporangium.

Holtum (1954) recorded of the genus that it “is a large and difficult one”. This is reflected in the account of Chambers and Farrant (1998a) and the previous attempts by them and others to circumscribe taxa. A lack of good qualitative characters by which they can be defined and the all too common occurrence of intermediate specimens suggests it would be better – and more practical – to treat some of them as a single, polymorphic species, *C. tenuifolia*. However, they are here maintained, albeit with reservation.

Description of the spores included below are taken from Chambers and Farrant (1998a).

Quirk *et al.* (1983) recorded that some species are apomictic or are likely to be apomictic and it is also known that some species are triploids (Tindale and Roy 2002). The mix of sexual and apomictic reproduction presumably explains some of the perplexing variation in this genus.

References: Quirk *et al.* (1983), Jones (1988), Chambers and Farrant (1991, 1998a), Tindale and Roy (2002).

Key to species of *Cheilanthes*

- 1a. Pinnules with long, curling, weak hairs and often their surfaces manifestly woolly 2
- 1b. Pinnules glabrous or hairy, but if hairy never with long, weak, curling hairs and the pinnule surface never obscured by the indumentum 4
- 2a. Stipe and rachis with abundant scales; hairs and scale bases branched *C. lasiophylla*
- 2b. Stipe and rachis with few scales; hairs and scale bases unbranched 3

- 3a. Pinnule margins incised and tending to be inrolled and partly covering the sori *C. sieberi*
- 3b. Pinnule margins entire, or almost so, and fairly flat and not covering sori *C. brownii*
- 4a. Pinnules (at least the terminal and near terminal pinnules in a pinna) narrowly oblong to linear in outline and more than 5 times longer than wide 5
- 4b. Pinnules never linear and less than 5 times longer than wide 6
- 5a. Pinnules always or mostly at least 10 times longer than wide; lamina 2-pinnate at base or sometimes trifoliate pinnules at base *C. nitida*
- 5b. Pinnules less than 10 times as long as wide; lamina 3-pinnate or 4-pinnatifid at base *C. caudata*
- 6a. Pinnules membranous and the minor veins conspicuous; lamina 1–3-pinnate at base *C. pumilio*
- 6b. Pinnules thick and minor veins generally indistinct; lamina 2–4-pinnate at base 7
- 7a. Lamina ovate or triangular, 2-pinnate or 3-pinnatifid at base; pinnule surfaces discolorous; midribs of primary pinnae dark for part of their length *C. praetermissa*
- 7b. Lamina linear, ovate or triangular, 2–5-pinnate or 5-pinnatifid, if ovate or triangular then 3- or 4-pinnate or 5-pinnatifid at base; lower pinnules usually concolorous; midribs of primary pinnae usually not dark 8
- 8a. Pinnules with the upper surface completely glabrous, the lower glabrous or almost so *C. sieberi*
- 8b. Pinnules with the upper surface and/or the margins sparsely to moderately hairy, the lower sparsely to densely hairy 9
- 9a. Pinnae with straight, stiff, pointed hairs *C. fragillima*
- 9b. Pinnae hairs not as above 10
- 10a. Lamina 2- or rarely 3-pinnate at base; longest hairs on upper surface of pinnae *ca* 0.5–0.6 mm long *C. nudiuscula*
- 10b. Lamina 3- or 4-pinnate at the base; longest hairs on upper surface of pinnae *ca* 0.3 mm long 11
- 11a. Hairs on the rachises, rachillas and midribs on the lower surface of the pinnules moderately dense; pinnules usually not well separated from each other and their apices tending to be obtuse *C. contigua*
- 11b. Hairs on the rachises, rachillas and the midribs on the lower surface of the pinnules sparse; pinnae usually well separated from each other and their apices tending to be acute *C. tenuifolia*

***Cheilanthes brownii* (Kuhn) Domin**
(Fig. 14A)

Gymnogramma brownii Kuhn, Bot. Zeitung (Berlin) 27: 458 (1869), as *Gymnogramme*.

Cheilanthes brownii (Kuhn) Domin, Biblioth. Bot. 20(85): 133 (1913).

Type: Arnhem South Bay, Point U [Mt Caledon, N.T.], 6 Feb. 1803, *R. Brown Iter Austral.* 5; holo: BM.

Fronds to 30 cm long, stipe and rachis dark reddish brown, with a scattered to dense indumentum of unbranched, uniscriate, multi-septate, apically acute, whitish or pale brown hairs to *ca* 4 mm long and some long, brownish, scale-like hairs on the rachis. Lamina ovate to lanceolate or narrowly elliptic, 3.5–18 cm long, 2.5–7 cm wide, 1- to 3-pinnate at base, but 2-pinnate for most of its length. Largest pinnae ovate to lanceolate, to 2.5 cm long; pinnules apically obtuse, the upper surface usually with a well-developed indumentum of whitish, tangled hairs, the lower surface obscured by long, brownish hairs. Spores spherical, smooth or variously ornamented, either ridged and 16 per sporangium or trilete and 32 per sporangium. Fertile plants: Dec.–Apr.

Distribution. Australian native (W.A., N.T., Qld) found throughout much of the N.T. (p.74).

Habitat. Crevices and shaded areas in rocky outcrops in a range of communities.

***Cheilanthes caudata* R. Br.**
(Fig. 14B, C)

Cheilanthes caudata R. Br., Prodr. 156 (1810).

Type: Port II [Port Clinton, Qld], *R. Brown*; holo: BM.

Cheilanthes pinnatifida D.L. Jones, Austrobaileya 2: 472 (1988).

Type: Lightning Dreaming, Arnhem Land, N.T., *D.L. Jones 1478*; holo: DNA; iso: BRI, CANB, MEL.

Fronds to 55 cm long, stipe and rachis reddish brown or sometimes blackish, glabrous or sparsely hairy, the hairs eglandular. Lamina ovate to oblanceolate or triangular to narrowly triangular, 6–22 cm long, 3.5–14 cm wide, 3-pinnate or 4-pinnatifid at base but 2-pinnate for most of its length. Largest pinnae to 8 cm long; largest pinnules narrowly oblong or somewhat lanceolate, 10–37 mm long, 1.5–5 mm wide, their margins entire to pinnatifid, the upper and lower surfaces glabrous or with a few very short eglandular hairs. Spores variously spiny, either spherical and 16 per sporangium or tetrahedral, trilete and 32 per sporangium. Fertile plants: Jan.–May.

Distribution. Northern Australia (W.A., N.T., Qld) and perhaps New Caledonia (p.74).

Habitat. Commonly growing between rocks and in crevices in rainforest and vine thickets and in shaded situations in woodland. Also recorded from the edge



Fig. 14. A. *Cheilanthes brownii*: fertile mid-pinna (Dunlop 6757). B, C. *Cheilanthes caudata*: B, frond; C, fertile lower surface of a mid-pinna (B, C, Jones 1462). D-F. *Cheilanthes contigua*: D, frond; E, mid-pinna, lower surface; F, basal pinnule, upper surface (D-F, Russell-Smith 5289). G-H. *Cheilanthes fragillima*: G, mid-pinna, lower surface; H, pinna, upper surface displaying the typical stiff, pointed hairs (G, H, Russell-Smith 5359). I-L. *Cheilanthes lasiophylla*: I, frond; J, scale from rachis; K, lower surface of fertile pinna; L, branching hair from rachis (I-L, Chippendale A2606). M, N. *Cheilanthes nitida*: M, frond (Brennan 840); N, basal pinna, lower surface (Russell-Smith 7170). Scale bars: D = 3 cm, M = 2 cm, B, C, E, G, I, N = 1 cm, A, F, H, J, K = 1 mm, L = 0.1 mm.

of streams and in marshy ground dominated by Restionaceae.

***Cheilanthes contigna* Baker**

(Fig. 14D–F)

Cheilanthes contigna Baker in Hook. and Baker, Syn. fil. 2nd ed., 476 (1874).

Type: Port Darwin, *Schultz* 35; holo: K.

Fronds to 65 cm long, stipe dark reddish brown, glabrous or with a sparse to dense indumentum of short hairs and some narrow scales, the rachis with a mix of short eglandular hairs and long hairs and narrow scales. Lamina ovate to ovate-lanceolate or triangular to narrowly triangular, 6–30 cm long 5–20 cm wide, 3- or 4-pinnate at base, but 2-pinnate for most of its length. Largest pinnae somewhat ovate, elliptic or triangular, to 18 cm long but usually less than 10 cm; pinnules close together, their surfaces with a sparse to conspicuous indumentum of short eglandular hairs which tend to be longer on the lower surface. Spores rounded-tetrahedral, granulose and trilete, with variable reticulate-echinate ornamentation, 32 per sporangium. Fertile plants: Dec.–July.

Distribution. Southern India east to New Guinea and northern Australia (W.A., N.T., Qld) and common in the Top End (p.74).

Habitat. Recorded from an array of habitats, including monsoon forest, vine thickets, the sandy banks of creeks, laterite mounds in *Melaleuca* swamps and open forest and woodland.

Notes. Details of the type specimen of *C. contigna* were originally given as “Port Darwin, N. Australia, R. Schomburgh (1869), No. 35”. Quirk (1983) and Chambers and Farrant (1991, 1998a) have since given the date of collection as October 1869. However, the specimen should be attributed to Frederiek Schultz, whose specimens were forwarded overseas by Schomburgh. This is clear from unpublished lists at Kew of specimens collected by Schultz from the Darwin region. Indeed the annotation “comm[unicated]: R. Schomburgh x/69” makes it clear that the date of October 1869 is also not the date of collection. In the list specimen 35 was recorded as “*Cheilanthes tenuifolia* Sw. var. (or a closely allied n. sp.)”.

There is little to distinguish this taxon from *C. tenuifolia*, differences in pinnule shape, arrangement and hair distribution being tendencies rather than absolute, diagnostic differences, but in keeping with recent treatments it is here maintained as a distinct species. For further comments see under *C. tenuifolia*.

***Cheilanthes fragillima* F. Muell.**

(Fig. 14G, H)

Notholaena fragilis Hook., Sp. fil. 5: 114 (1864), non *Cheilanthes fragilis* Hook.

Cheilanthes fragillima F. Muell., Fragm. 5: 123 (1866).

Type: Fitzmaurice River, Oct. 1855, *F. Mueller*; holo: MEL 503529.

Fronds to 50 cm long, stipe dark brown, commonly glabrous or almost so but some hairs and scales usually at the base and sometimes uniseriate, multiseptate, brownish hairs along the length of the stipe, the rachis dark reddish brown and with white, straight, pointed hairs. Lamina shallowly deltate to triangular or widely depressed ovate to ovate, 5–28 cm long 5–20 cm wide, 3- or 4-pinnate at base and grading to 1-pinnate at the apex. Largest pinnae shallowly deltate to triangular, to 8 cm long; pinnules with margins and both surfaces with an indumentum of white, straight, rigid, pointed hairs. Spores rounded-tetrahedral, granulose and trilete, with variable reticulate-echinate ornamentation, 32 per sporangium. Fertile plants: Nov.–July.

Distribution. Endemic to northern Australia (N.T., W.A.) and widespread in northern N.T. (p.74).

Habitat. Mostly recorded from eucalypt forest and *Allosyncarpia* forest in sandstone country.

Notes. Following Chambers and Farrant (1991), specimens such as *Bowman* 363 and *Jones* 1685 from Melville Island and others from Bathurst Island and parts of the mainland which “morphologically ... appear to be uncommon intermediates between” *C. contigna* and *C. fragillima* are here referred to *C. fragillima* by virtue of their possession of rigid, straight white hairs on the pinnae. They somewhat resemble *C. contigna* in that the pinnae also have short hairs on the upper surface. Although not consistently so, they also tend to have broader pinnules than other specimens referred to *C. fragillima*.

***Cheilanthes lasiophylla* Pic. Serm.**

(Fig. 14I–L)

Notholaena caesceus Kunze, Ind. sem. hort. Lips. 3 (1845), *nom. illeg.*, non *Cheilanthes canescens* Kunze, Linnaea 13: 143 (1839).

Cheilanthes lasiophylla Pic. Serm., Webbia 8: 209 (1951).

Type: Jardin de Leipzig (raised by chance from spores brought from Australia to the garden by L. Preiss), 1846, *G. Kunze*; lecto: K (Pic. Serm. l.c., p. 207).

Notholaena lasiopteris F. Muell., J. Bot. (Hooker) 5: 105 (1853), *nom. nud.*

Fronds to ca 40 cm long, stipe and rachis dark reddish brown, with a prominent indumentum of branched hairs and scales. Lamina narrowly elliptic, lanceolate or linear, 7.5–33 cm long, 2.5–4.5 cm wide, 2-pinnate at base and for most of its length. Largest pinnae triangular or ovate, to 2.5 cm long; pinnules with the upper surface with a sparse to moderately dense indumentum of slender, branched hairs, the lower surface with a dense indumentum of hairs and some scales. Spores spherical, granulose and ridged, surface

variably reticulate, 16 per sporangium. Fertile plants: throughout the year.

Distribution. Australia (all mainland states). In the N.T. restricted to the southern region (p.74).

Habitat. In crevices and shaded areas of rocky outcrops.

Cheilanthes nitida (R. Br.)

(Fig. 14M, N)

Pteris nitida R.Br., Prodr. 155 (1810).

Cheilanthes nitida (R. Br.) P.S. Green, Kew Bull. 43: 653 (1988).

Type: tropical Australia, *R. Brown*; holo: not traced; Port Darwin, *Schultz* 796; neo: K (see P.S. Green 1988).

Acrostichum pteroides R. Br., Prod. 145 (1810).

Neurosoria pteroides (R. Br.) Mett., Bot. Zeitung (Berlin) 27: 438 (1869), *non Cheilanthes pteroides* Sw.

Type: North Coast Island, *R. Brown Iter Austral.* 3; holo: BM.

Fronds to ca 40 cm long, stipe and rachis dark reddish brown, mostly glabrous except for scales and hairs near the base. Lamina oblong or ovate, 4–18 cm long 4–8 cm wide, usually 2-pinnate, rarely 3-pinnate at the base and 1- or 2-pinnate for most of its length. Largest pinnae to 7 cm long; pinnules linear and mostly ten times longer than wide, margins entire or sometimes shallowly lobed, upper surface glabrous, lower surface glabrous or with the midrib sparsely hairy. Spores tetrahedral, granulose and trilete, with variable echinate ornamentation, 32 per sporangium. Fertile plants: Dec.–June.

Distribution. Northern Australia (N.T., Qld) (p.74).

Habitat. Recorded from *Allosyncarpia* forest and vine thickets in sandstone country and also from seasonally wet areas in woodland with dominants such as *Callitris intratropica*, *Livistona humilis* and *Eucalyptus miniata*.

Cheilanthes nudiuscula (R. Br.)

(Fig. 15A–C)

Pteris nudiuscula R. Br., Prodr. 155 (1810).

Cheilanthes nudiuscula (R. Br.) T. Moore, Index. Fil. 249 (1860).

Type: tropical coast of Australia, *R. Brown Iter Austral.* 60; holo: BM.

Pteris hirsuta Poir. in Poir. and Lama., Encycl. 5: 719 (1804).

Cheilanthes hirsuta (Poir.) Mett., Farngett. 3: 69 (1859), *nom. illeg.*, *non* Link (1833).

Type: locality and date unknown, *P. Sonnerat*; holo: P.

Fronds to ca 30 cm long, stipe dark reddish brown, with a conspicuous indumentum of hairs and scales; rachis with some scales and prominently hairy, the longest hairs ca 1 mm long, septate, glandular. Lamina elliptic to lanecolate or somewhat linear, 3–20 cm long, 2–5 cm wide, 2- or 3-pinnate at base, but 2-pinnate for most of its length. Largest pinnae to 3 cm long;

pinnules oblong or triangular, margins entire or lobed, upper surface glabrous or with a sparsely hairy, lower surface with a sparse to dense indumentum of hairs about the same length as those on the upper surface. Spores spherical, granulose and ridged, with variable amounts of echinate ornamentation, 16 per sporangium. Fertile plants: Jan.–July.

Distribution. Hong Kong south to the Philippines, New Caledonia, Fiji, Timor and Australia (W.A., N.T., Qld) (p.74).

Habitat. Recorded from a range of moist habitats, including woodland, lancewood thickets, rocky vine thickets and under rocks on a coastal cliff.

Notes. Chambers and Farrant (1991, 1998a) recorded that the hairs on the lower surface of the pinnules are longer than those on the upper surface, but in some specimens determined by them, the hairs are about the same length on both surfaces.

This species, as much as any, highlights the difficulty in delimiting taxa in *Cheilanthes*. Seven specimens housed in DNA were determined by Farrant and Chambers as being of *C. nudiuscula*, another seven were deemed to be “unusual forms” or “atypical” *C. nudiuscula*. All have been used to compile the description and are included in the distribution map.

Cheilanthes praetermissa D.L. Jones

(Fig. 15D)

Cheilanthes praetermissa D.L. Jones, Austrobaileya 2: 472, fig. 2 e, d. (1988).

Type: near Mt Howship, East Alligator River area, 19 Feb. 1984, *D.L. Jones 1443*; holo: DNA; iso: BRI, CANB, MEL.

Fronds to ca 40 cm long, stipe and rachis dark reddish brown, glabrous or with a sparse indumentum of hairs and scales. Lamina somewhat triangular or ovate, 4–17 cm long 2.5–13 cm wide, 2-pinnate or 3-pinnatifid at base, but 2-pinnate for most of its length, leathery. Largest pinnae somewhat triangular, to 7 cm long; basal pinnae unequally basicopically divided; all pinnae and some pinnules with the undersurface with a dark midvein extending part of their length but other venation generally obscure, their surfaces tending to be obviously discoloured, the upper darker than the lower, both surfaces usually glabrous or almost so. Spores rounded-tetrahedral, granulose and trilete, with sparse reticulate-echinate ornamentation, 32 per sporangium. Fertile plants: Dec.–June.

Distribution. Endemic to the Top End of N.T. or possibly also extending (*Fl. Australia* vol. 48: map 256) into the Kimberley Region of W.A (p.74).

Habitat. Recorded from crevices of both granite and sandstone rock. Recorded from *Allosyncarpia* forest but mostly gathered from eucalypt woodland.

Notes. On pinnae and pinnule shape probably most likely to be confused with *C. pumilo* but the comparatively thick pinnae and obscure minor venation



Fig. 15. A-C. *Cheilanthes nudiuscula*: A, frond; B, lower surface of pinna; C, hair from pinna (A-C, Latz 10530). D. *Cheilanthes praetermissa*: frond, lower surface (Jones 1435). E, F. *Cheilanthes pumilio*: E, frond, lower surface; F, fertile pinna (E, F, Byrnes 676). G. *Cheilanthes sieberi* subsp. *sieberi*: frond, lower surface (Henshall 1977). H. *Cheilanthes sieberi* subsp. *pseudovellea*: frond, lower surface (Henshall 174). I, J. *Cheilanthes tenuifolia*: I, frond; J, pinnule, lower surface (I, J, Dunlop 6877). Scale bars: I = 2 cm, A, D, E = 1 cm, G = 2 mm, B, F, H, J = 1 mm, C = 0.1 mm.

distinguish it from that species. The specimen *Jones 1428* has pinnae and pinules of similar shape to this species but instead of being glabrous, pinnules have a prominent indumentum of short hairs. According to a determinavit slip added by Farrant it has close affinities with *C. contigua*.

***Cheilanthes pumilio* (R. Br.) F. Muell.**

(Fig. 15E, F)

Notholaena pumilio R. Br., Prod. 146 (1810).

Pteris pumilio Banks and Sol., *ined.*

Cheilanthes pumilio (R. Br.) F. Muell., Syst. census Austral. pl. 138 (1882).

Type: Endeavour River, Qld, *J. Banks* and *D. Solander*; holo: BM; iso: NSW.

Notholaena paucijuga Baker in Hook. and Baker, Syn. fil. 2nd ed, 515 (1874).

Type: Port Darwin, communicated by R. Schomburgk; holo: K.

Cheilanthes cavernicola D.L. Jones, *Austrobaileya* 2: 469, fig. 1 (1988).

Type: Oenpelli area, Arnhem Land, N.T., 12 June 1978, *T.S. Henshall 1951*; holo: DNA; iso: AD, BRI.

Cheilanthes dunlopii D.L. Jones, *Austrobaileya* 2: 470, fig. 2 a, b. (1988).

Type: Keep River NP, 3 Mar. 1981, *C.R. Dunlop 5838*; holo: DNA.

Fronds to 50 cm long, stipe and rachis dark reddish brown, glabrous or with a sparse to conspicuous indumentum of scales and eglandular hairs. Lamina triangular or ovate, 3.5–22 cm long, 3–12 cm wide, 1–3-pinnate at base, but 1-pinnate or 2-pinnatifid for most of its length, thin and somewhat membranous. Largest pinnae ovate to lanceolate or triangular, to 8 cm long; lowest pinnae often unequally basicopically divided; all pinnae and pinnules with conspicuous venation, hydathodes usually present, surfaces concolorous or almost so, glabrous or sparsely to densely hairy, the hairs short to long, with cottony hairs absent, sparsely distributed or sometimes in large numbers. Spores granulose and echinate, either spherical and 16 per sporangium or rounded-tetrahedral and trilobate and 32 per sporangium. Fertile plants: throughout the year.

Distribution. Northern Australia (W.A., N.T., Qld) (p.74).

Habitat. Often in sandstone country, including vine forest thickets and *Allosyncarpia* forest but also recorded from forest on laterite, along stream banks and from amongst mudstone boulders near the sea.

Notes. As with the type specimen of *C. contigua* (see note under that species), the type of *C. paucijuga* was presumably collected by Schultz.

A polymorphic taxon characterised by the membranous texture of the pinnae and the clearly evident venation. The vestiture is extremely variable with specimens, such as the one illustrated, with a

prominent cover of cottony hairs once being referred to *C. cavernicola*.

***Cheilanthes sieberi* Kunze**

Cheilanthes sieberi Kunze in Lehm., Pl. Preiss. 2: 112 (1847).

Cheilanthes tenuifolia var. *sieberi* (Kunze) Hook.f., Handb. N. Zeal. fl. 362 (1867).

C. tenuifolia subsp. *sieberi* (Kunze) Domin, Biblioth. Bot. 85: 140 (1915).

Type: York, *Preiss 1304*; lecto: BM; isolecto: P, *fide* Quirk *et al.*, Austral. J. Bot. 31: 517, 520 (1983).

Fronds to 55 cm long, stipe and rachis dark brown or reddish brown, glabrous or with scales and a sparse to moderately dense indumentum of hairs which may be twisted and glandular. Lamina ovate to linear lanceolate, 4.5–25 cm long, 2–5.5 cm wide, 3-pinnate at base and grading to 1-pinnate at the apex, often 2-pinnate for much of its length. Largest pinnae ovate or triangular, to ca 3 cm long; pinnules incised and their margins inrolled and partly covering the sori, surfaces glabrous or with twisted hairs. Spores spherical, with wart-like outgrowths, either black and 16 per sporangium or brown and 32 per sporangium. Fertile plants: throughout the year.

Key to subspecies of *C. sieberi*

- 1a. Surfaces of pinnules glabrous and lacking twisted hairs subsp. *sieberi*
- 1b. Surfaces of pinnules with an indumentum of twisted hairs subsp. *pseudovellea*

Cheilanthes sieberi* subsp. *sieberi

(Fig. 15G)

Rachis and rachillas glabrous or with a sparse to conspicuous indumentum of scales and hairs. Pinnules with the upper surface glabrous, the lower surface glabrous or with few hairs.

Distribution. Australia (all states and mainland territories plus Lord Howe Island), New Caledonia and New Zealand (p.74).

Habitat. Common in sheltered areas on rocky outcrops and in shrubland, e.g. in the shade of mulga shrubs and under tussocks of *Triodia*.

Cheilanthes sieberi* subsp. *pseudovellea

Quirk and Chambers

(Fig. 15H)

Cheilanthes pseudovellea (H.M.Quirk and T.C. Chambers) D.L. Jones, *Austrobaileya* 2: 479 (1988).

Cheilanthes sieberi subsp. *pseudovellea* H.M.Quirk and T.C.Chambers, Austral. J. Bot. 31: 522 (1983).

Type: 20 km N of Mt Isa Waterhole, Qld, Feb. 1977, *T. Farrell*; holo: MEL 829830.

Rachis and rachillas with a moderate to dense indumentum of twisted hairs. Pinnules with both surfaces with twisted hairs, mostly denser on the under surface.

Distribution. Central Australia (?W.A., N.T., S.A., Qld, N.S.W.) (p.74).

Habitat. Essentially as with subsp. *sieberi* although Jones (1988) noted that, although they may grow together, subsp. *pseudovellea* is often in drier situations than that taxon.

Cheilanthes tenuifolia (Burm.f.) Sw.
(Fig. 151, J)

Trichomanes tenuifolia Burm.f., Fl. Ind. 237 (1768).

Cheilanthes tenuifolia (Burm.f.) Sw., Syn. fil. 129, 332 (1806).

Type: Sri Lanka, *N.L. Burman*; holo: G 1416.

Fronds to ca 70 cm long, stipe and rachis dark reddish brown, glabrous or with a sparse indumentum of hairs and narrow scales. Lamina somewhat triangular, pentagonal or ovate 9–35 cm long 8–20 cm wide, 3- or 4-pinnate at base, but 2- or 3-pinnate for most of its length. Largest pinnae somewhat triangular, to 15 cm long; pinnules usually well-spaced and their surfaces glabrous or with a few, scattered short, eglandular hairs. Spores tetrahedral or rounded-tetrahedral, granulose and trilete, with variable reticulate-echinate ornamentation, 32 per sporangium. Fertile plants: Nov.–May.

Distribution. Ranges from India, Sri Lanka and Nepal east to southeast Asia, Australia (?W.A., N.T., Qld) and various Pacific islands. In the N.T. confined to the northern region (p.74).

Habitat. Occurs in a variety of habitats, including coastal and inland monsoon forest and vine thickets, woodland, and the edge of paperbark swamps.

Notes. This species and *C. contigua* have identical spore morphologies and it can be difficult to distinguish between the two. Indeed, at DNA there are specimens determined by Farrant as being *C. contigua* “but close to *C. tenuifolia*” (and vice versa). The two names, *C. tenuifolia* and *C. contigua* are here maintained.

Doryopteris J. Sm.

Ferns terrestrial or lithophytic. Rhizome short- to long-creeping, with bicolorous scales. Fronds monomorphic or sometimes dimorphic, the fertile ones with narrower segments and often a more complex lamina. Stipes shiny, brown or black, with basal scales. Lamina simple or pinnatifid and appearing palmate, leathery, glabrous; veins free or anastomosing but only the major blackish veins visible. Sori marginal or nearly so and more or less continuous, protected by the reflexed, membranous margins of the lamina. Spores trilete, tetrahedral-globose, plain or ornamented.

Pantropical genus with perhaps 25 species, most of which occur in Brazil. Two species in Australia, but only *D. concolor* in the N.T.

Doryopteris concolor (Langsd. and Fisch.) Kuhn
(Fig. 16A)

Pteris concolor Langsd. and Fisch., Icon. fil. 19, t. 21 (1810).

Doryopteris concolor (Langsd. and Fisch.) Kuhn in Deeken, Reisen. Ost. Afr., Bot. 3(3): 19 (1879).

Type: Nuku Hiva, Marquesas Archipelago, *G.H. von Langsdorff*; holo: ?LE; iso: B (herb. Willdenow 1996–1), *fide* R.M. Tryon and R.G. Stolze, Fieldiana Bot., n.s. 22: 31 (1989).

Rhizome short-creeping; scales narrowly triangular, 1.5–2.5 mm long, discolorous, with brown axes and pale margins, the margins entire or inconspicuously toothed. Fronds monomorphic or almost so, 6–25 cm long, somewhat crowded. Stipes 3.5–20 cm long, dark reddish-brown, with two very narrow wings for much of its length. Lamina broadly triangular in outline, 2.5–10 cm long, 2–8.5 cm wide, tripartite and appearing palmate, each part 1- to 3-pinnatifid; rachis with scattered scales; veins except for the central vein of the largest segments invisible. Sori marginal and more or less continuous. Fertile plants: Nov.–July.

Distribution. A pantropical species (Australia: W.A., N.T., Qld) which in the N.T. is only known from the Top End (p.75).

Habitat. A fern of monsoonal forests, with all collections from sandstone country and often from *Allosyncarpia* forest.

Paraceterach (F. Muell.) Copel.

Ferns terrestrial or lithophytic. Rhizome short-creeping or suberect, with bicolorous scales. Fronds nearly monomorphic. Stipes shiny, brown or black, with concolorous scales. Lamina 1-pinnate (in Australia), with a dense indumentum of toothed scales; veins free, forking. Sori exindusiate, linear along veins, often concealed by the indumentum, forming a marginal band 1.5–3 mm wide. Spores trilete.

Ranging from the Canary Islands and southern Europe to Asia and Australia, this is a genus of seven species, two of which are confined to Australia and occur in the N.T.

The name *Notholaena* has been accepted as one that applies to a number of ferns inhabiting arid and seasonally dry habitats in many parts of the world and the genus was originally lectotypified with the Antillean *Pteris trichomanoides* L. Yatskievych and Smith (2003) noted that there have been attempts to overturn this lectotypification, with *Acrostichum marantae* L. proposed as the new lectotype, and that acceptance of this would mean that *Paraceterach* would become a synonym of *Notholaena* and the appropriate combination would be unavailable for *P. muelleri*. As argued by the authors, for the sake of nomenclatural stability the lectotypification should not be overturned.

Key to species of *Paraceterach*

- 1a. Pinna scales partly with long-ciliate margins *P. muelleri*
- 1b. Pinna scales with smooth or minutely denticulate margins *P. reynoldsii*

Paraceterach muelleri (Hook.) Copel.

(Fig. 16B, C)

Gymnogramma muelleri Hook., Spec. fil. 5: 143, t. 295 (1864), as *Gymnogramme*.

Paraceterach muelleri (Hook.) Copel., Gen. fil. 75 (1947).

Type: Fort Cooper, Qld, *E. Bowman* 229; iso: MEL.

Rhizome short-creeping; scales narrowly triangular, the middle thick and black, the narrow edges brown and membranous. Fronds 10–40 cm long, close together on the rhizome. Stipes brown to blackish, with a mostly dense indumentum of uniseriate hairs and narrowly triangular, whitish to pale brown scales with toothed to shortly ciliate margins. Lamina 1-pinnate, the three uppermost pinnae often but not always separated from each other; lateral pinnae widely ovate to lanceolate, 10–32 mm long, 7–17 mm wide, margins entire; scales of the lamina somewhat ovate to lanceolate, 1.2–2.5 mm long, 0.3–0.45 mm wide, usually broadest above the base, margins long-ciliate, the scales on the upper surface comparatively sparse and whitish and the green surface of the lamina clearly visible, those on the lower surface dense and pale brown and obscuring the surface of the lamina. Fertile plants: Jan.–Oct.

Distribution. Occurs in W.A., N.T. and Qld. In the N.T. most specimens are from the Victoria River district, with others from near Beswick and Wollogorang Station (p.77).

Habitat. Sheltered sandstone gorges and rock crevices, often in vine forest.

Paraceterach reynoldsii (F. Muell.) Tindale

(Fig. 16D)

Notholaena reynoldsii F. Muell., Fragm. 8: 175 (1874).

Paraceterach reynoldsii (F. Muell.) Tindale in J.M. Black, Fl. S. Austral. 3rd ed., 53 (1978).

Type: near the Olgas, central Australia, *W.C. Gosse*; ?holo: K (*vide* P. Bostock, *in litt.*).

Rhizome long-creeping; scales narrowly triangular, the middle thick and black, the edges brown and membranous. Fronds 6–30 cm long, close together on the rhizome. Stipes brown to blackish, with a sparse to dense indumentum of numerous uniseriate hairs and narrowly triangular to linear triangular, pale brown scales with entire or inconspicuously toothed margins. Lamina 1-pinnate, the two or three uppermost pinnae often not separated from each other; lateral pinnae widely ovate to ovate elliptic, 10–23 mm long, 4.5–13

mm wide, margins entire; scales of the lamina narrowly triangular to linear triangular, 0.8–1.7 mm long, 0.2–0.4 mm wide, margins entire or minutely denticulate, the scales on the upper surface whitish or pale brown and the lamina surface clearly visible, those on the lower surface pale brown and usually denser than those on the upper surface and sometimes obscuring the surface of the lamina. Fertile plants: Feb.–Oct.

Distribution. A species of arid Australia (W.A., N.T., S.A.), with all N.T. specimens from the southern region, e.g. at Mt Zeil, and Ellery, Joker and Ormiston gorges (p.77).

Habitat. Found in the shelter of rock shelves and crevices.

Pityrogramma Link

Ferns terrestrial or lithophytic. Rhizome erect or (not in Australia) creeping, with narrow, thin, concolorous scales with entire margins. Fronds monomorphic or almost so, the fertile being more erect. Stipes tufted, with basal scales. Lamina 2–4-pinnate, membranous or somewhat leathery, upper surface glabrous, lower surface whitish or yellowish and with short glandular hairs; veins free. Sori exindusiate, borne away from the margins along the length of the veins; paraphyses absent. Spores trilete, tetrahedral-globose, ornamented.

A genus of ca 16 species, with most native to tropical America and with several in Africa. One species, *P. calomelanos*, is naturalised in Australia.

Pityrogramma calomelanos (L.) Link var.

calomelanos

(Fig. 16E)

Silver fern

Acrostichum calomelanos L., Sp. pl. 2: 1072 (1753).

Pityrogramma calomelanos (L.) Link, Handbuch 3: 20 (1833).

Type: South America; holo: LINN 1245.19, *vide* R.M. Tryon, Contr. Gray Herb. 189: 60 (1962).

Rhizome erect; scales linear, attenuate, brown. Fronds suberect to erect, to ca 90 cm tall, tufted. Stipe to ca 50 cm long, the few scales similar to those of the rhizome. Lamina to ca 40 cm long, 2-pinnate, the longest primary pinna ca 15 cm long; lower surface with a white waxy coating; veins obscure. Sporangia spreading over most of the lower surface at maturity. Fertile plants: June.

Distribution. Native to America, this species is now widely naturalised in many tropical regions with the var. *calomelanos* recorded from the N.T. and Qld. In the N.T. it is sometimes noted as a weed in plant nurseries although it was collected in 1977 from a cliff face at Lameroo Beach, Darwin, and is also known from near the Tomkinson River, south of Maningrida (p.77).

Habitat. Rainforest.

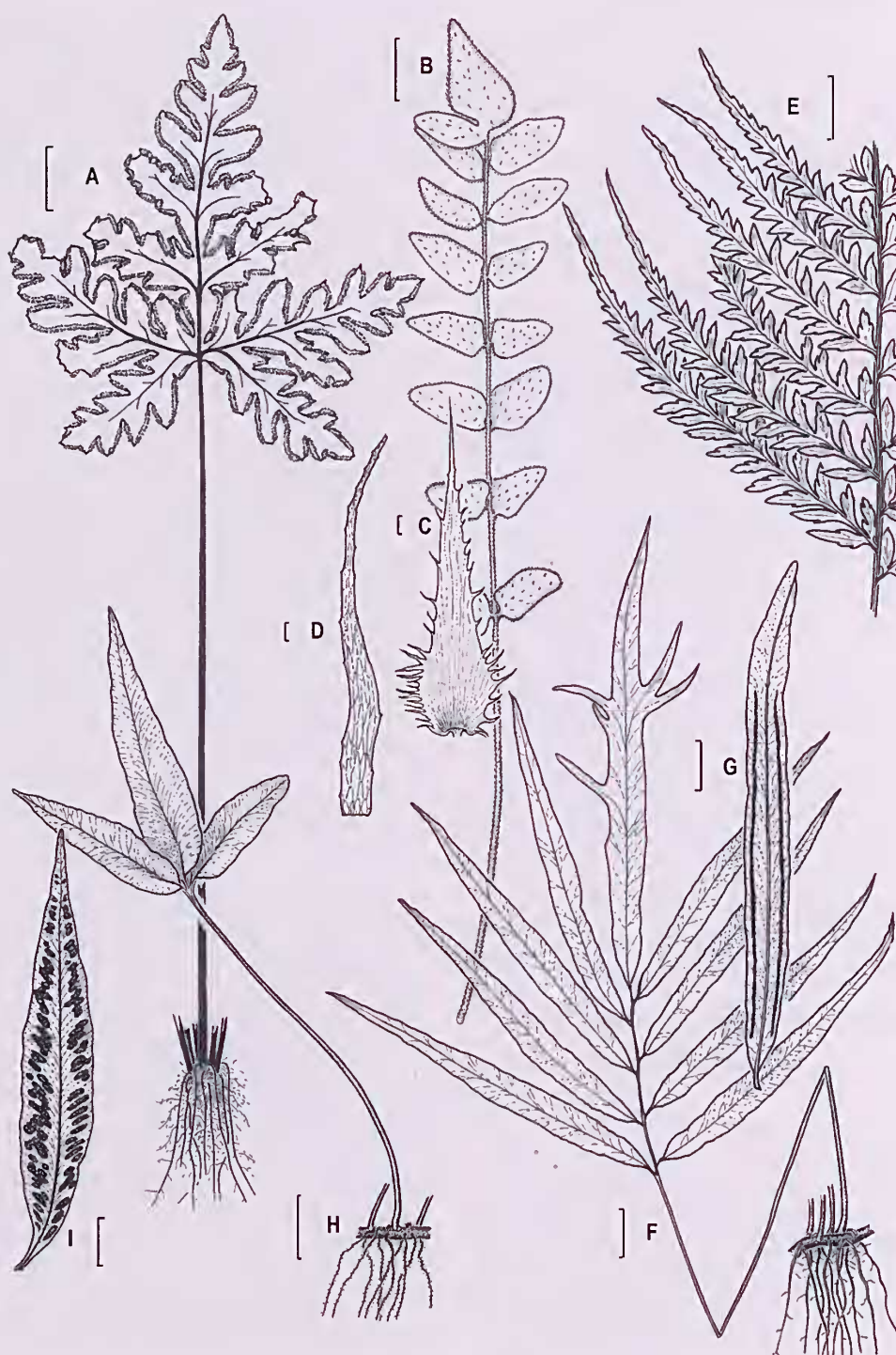


Fig. 16. A. *Doryopteris concolor*: frond with attached rhizome (Dunlop 8472). B, C. *Paraceterach muelleri*: B, frond; C, scale from pinna (B, C, Leach 2468). D. *Paraceterach reynoldsii*: scale from pinna (Orchard 820). E. *Pityrogramma calomelanos* var. *calomelanos*: part of frond (Henshall 1358). F, G. *Taenitis blechnoides*: F, frond with attached rhizome (Menkhorst 996); G, fertile pinna with continuous bands of sori (Russell-Smith 2061). H, I. *Taenitis pinnata*: H, frond with attached rhizome; I, fertile pinna showing sori along individual veins (H, I, Brennan 1570). Scale bars: B, F, H = 2 cm, A, E, G, I = 1cm, C-D = 0.2 mm.

***Taenitis* Willd. ex Schkuhr.**

Ferns terrestrial. Rhizome creeping, with rigid bristles. Fronds monomorphic or dimorphic, fertile fronds often with narrower pinnae than the sterile fronds. Stipes dark, glossy, the upper side grooved, at least near the apex. Lamina generally simple when young and 1-pinnate when mature but sometimes simple lamina fertile, glabrous; pinnae entire, shortly stalked except for uppermost 1 or 2 pairs; veins anastomosing and forming oblique areolae without included veinlets. Sori exindusiate, spreading and discontinuous along individual veins or in almost continuous bands between the costa and margin of the pinna; indusium absent; paraphyses abundant, multicellular. Spores trilete, tetrahedral-globose, ornamented.

A taxonomically difficult genus with perhaps 15 species, distributed from India to southern China, Malesia, northern Australia (two species) and Fiji.

References: Holttum (1968), Bostock (1998a).

Key to species of *Taenitis*

- 1a. Sori in a single, almost continuous band between the margins and midrib *T. blechnoides*
- 1b. Sori discontinuous along individual veins
..... *T. pinnata*

***Taenitis blechnoides* (Willd.) Sw.**

(Fig. 16F, G)

Pteris blechnoides Willd., *Phytographia* 13, t. 9, fig. 3 (1794).

Taenitis blechnoides (Willd.) Sw., *Syn. fil.* 24: 220 (1806).

Type: South India, *D. Klein*; iso: B (herb. Willdenow), *fide* Holttum, *Blumca* 16: 90 (1968).

Rhizome with rigid, reddish brown, shiny bristles. Fronds 30–90 cm long, simple when young but otherwise 1-pinnate. Pinnae 4–15, linear-lanceolate or linear, 7–24 cm long, 1–3 cm wide, margins entire but sometimes somewhat undulate, occasionally one or more pinnae with up to 6 irregular lobes; fertile pinnae commonly manifestly narrower than the sterile ones. Sori in a single, almost continuous band which tends to be closer to the margin than to the costa. Fertile plants: throughout the year.

Distribution. Sri Lanka and southern India, east to Malesia, Australia (N.T., Qld), Fiji and Caroline Islands (p.78).

Habitat. A rainforest species often growing in swampy conditions, along creeklines and around springs.

***Taenitis pinnata* (J. Sm.) Holttum**

(Fig. 16H, I)

Syngramma pinnata J. Sm., *London J. Bot.* 4: 168, t. 7, 8. (1845).

Taenitis pinnata (J. Sm.) Holttum, *Kew Bull.* 13: 453 (1959).

Type: Island of Jobia [= Japen], West New Guinea, *Barclay*; holo: K, *fide* Holttum, *l.c.*

Rhizome with rigid, reddish brown, shiny bristles. Fronds to 80 cm long, simple or 1-pinnate, simple lamina sometimes fertile. Pinnac 2–15, lanceolate to linear-lanceolate, 5–20 cm long, 1–3 cm wide; fertile pinnae the same width or only slightly narrower than the sterile ones. Sori scattered in irregular, oblique lines along the veins. Fertile plants: Oct.

Distribution. Northern Australia (W.A., N.T., Qld), New Guinea, Solomon Islands, Vanuatu, and Fiji. The only record from the N.T. is *Brennan 1570* from the upper regions of Magela Creek (p.78).

Habitat. The only specimen was collected from fissures in a sandstone rock face near a spring.

Notes. Holttum (1968) recognised three varieties and if his treatment is followed the N.T. specimens are referable to var. *pinnata*.

Measurements were based on the description provided by Bostock (1998a) and Brennan's collection consisting of fronds with only 2 or 3 lobes and simple fronds, one of which is fertile.

Parkeriaceae

A monogeneric family.

Reference: Lloyd (1994).

***Ceratopteris* Brongn.**

Aquatic or subaquatic, may be free-floating; rhizome short, spongy and with translucent scales on the apex. Fronds in a rosette, dimorphic; stipes green, fleshy. Sterile fronds simple to 3-pinnate and with broad lobes. Fertile fronds up to 5-pinnate, more deeply dissected and with narrow lobes, with revolute margins covering the sporangia. Sporangia solitary, in 1–4 rows on the lower surface of the frond, large and shortly stalked, thin-walled. Spores trilete (tetrahedral), ridged.

Species delimitation in *Ceratopteris* is problematic, with one variable species to as many as 12 species having been recognised.

***Ceratopteris thalictroides* (L.) Brongn.**

(Fig. 17A, B)

Acrostichum thalictroides L., *Sp. pl.* 2: 1070 (1753).

Ceratopteris thalictroides (L.) Brongn., *Bull. Soe. Philom. Paris*, ser. 3, 8: 186 (1822).

Type: Sri Lanka, *P. Hermann s.n.*; lecto: Herb. P. Hermann 3: 42 (BM 621957), *fide* Pich. Serm., *Webbia* 12: 651 (1957).

Plants amphibious, rooted. Fronds succulent. Sterile fronds 1–3 pinnate, 8–40 cm long, lobes broad. Fertile fronds erect, 2–4 pinnate, usually exceeding the sterile ones, 25–60 cm long, lobes linear. Plantlets sometimes developing on fronds. Fertile plants: throughout the year.

Distribution. A pantropical, highly polymorphic species (Australia: W.A., N.T., Qld, N.S.W.). In the N.T. it is widespread in the Top End and Gulf region.

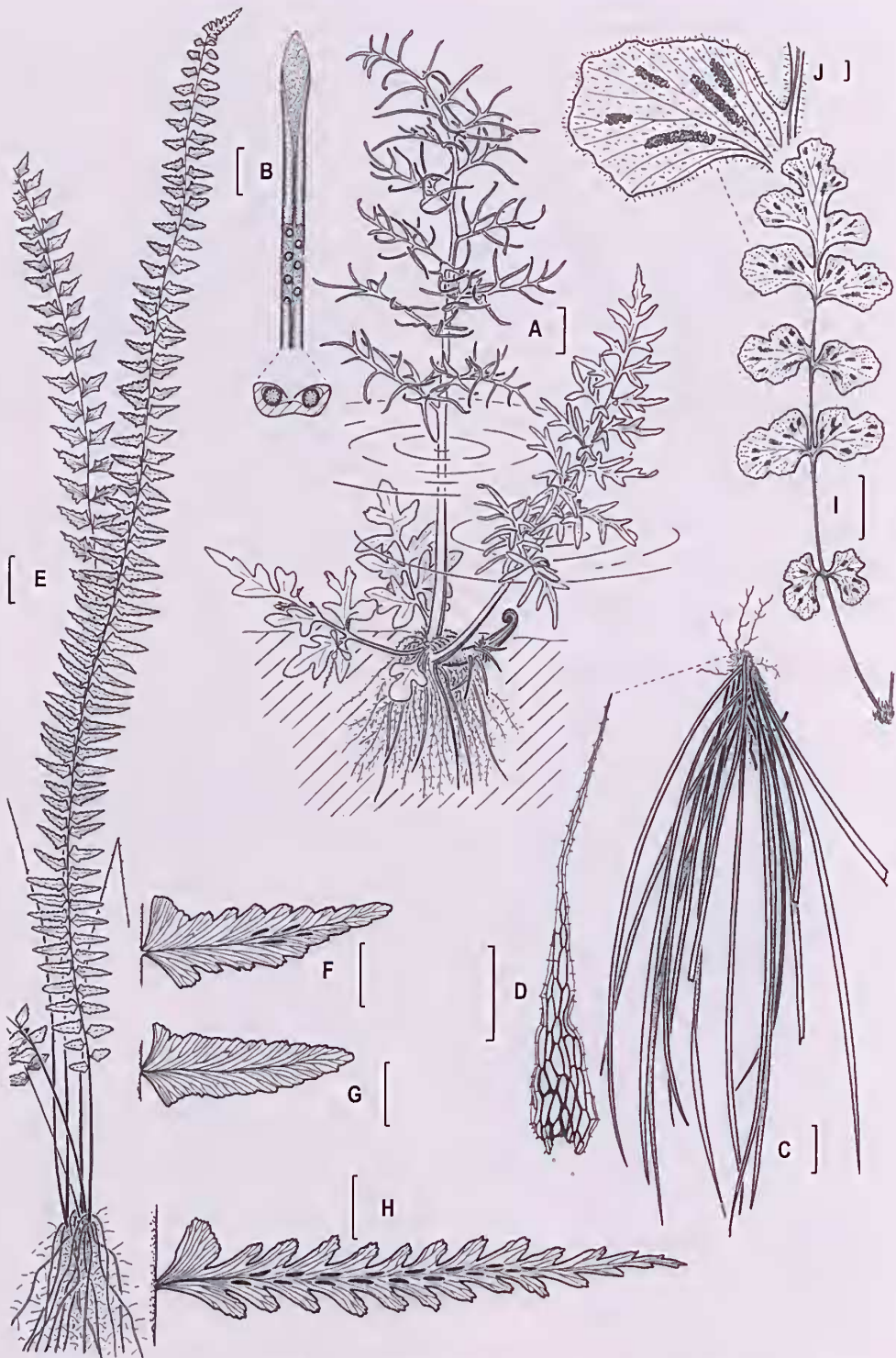


Fig. 17. A, B. *Ceratopteris thalictroides*: A, plant; B, fertile pinnule, including transverse section (Madsen 32). C, D. *Vittaria ensiformis*: C, plant, showing pendulous habit; D, rhizome scale (C, D, Jones 1297). E-G. *Asplenium* (Litchfield entity): E, plant with rhizomes; F, upper pinna with sori; G, basal pinna (E-G, Harwood 564). H. *Asplenium* (Nabarlek entity): upper pinna with sori (Russell-Smith 3875). I, J. *Pleurosorus subglandulosus*: I, frond, lower surface; J, pinna with exindusiate sori (I, J, Leach 2027). Scale bars: E = 4 cm, A, C = 3 cm, F-I = 1 cm, B = 2 mm, D, J = 1 mm.

Localities include Bitter Springs (Mataranka), Cato River, Holmes Jungle, coastal plains near the mouth of Goromuru River, North Goulburn Island and floodplains of the Howard River (p.74).

Habitat. Grows on the margins of floodplains, swamps, billabongs and slow-flowing streams. In clay, sand or peaty substrate.

Notes. Lloyd (1974) recognised four species of *Ceratopteris* and indicated that some specimens “with an affinity to *C. cornuta*” have been collected from Australia. All Top End specimens examined appear to be referable to the one taxon, *C. thalictroides*.

Vittariaceae

Six to nine genera and *ca* 100 species worldwide. Three genera and nine species in Australia, but only one species in the N.T.

References: Andrews (1990), Kramer (1990c), Jones (1998b).

Vittaria Sm.

Plants epiphytic or lithophytic. Rhizome creeping and immersed in a mat of roots; scales narrow and attenuate. Fronds simple, entire, crowded or scattered. Stipe very short and barely defined from the lamina. Lamina narrowly elliptic, oblanceolate or linear, erect, curved or pendulous, leathery; veins indistinct. Sori exindusiate, linear along the submarginal vein, more or less in grooves; paraphyses common, unbranched or branched and usually with prominent terminal cells.

A genus of 50–80 species found in tropical and warm-temperate regions of the world. Many species are ill-defined. Two species in Australia, with only *V. ensiformis* in the N.T.

Vittaria ensiformis Sw.

(Fig. 17C, D)

Vittaria ensiformis Sw., Ges. Naturf. Freunde Berlin Neue Schriften 2: 134, t. 7, fig. 1 (1799).

Type: Mauritius, *P. Somnerat*; holo: ?P.

Rhizome short, branched; roots covered in ginger hairs; scales narrowly triangular to linear triangular, 2.5–6 mm long, latticed, the central veins of the scales thick and blackish, the outer veins comparatively thinner and brown, the scale margins minutely toothed. Fronds crowded. Lamina linear, 5–50 cm long, 0.25–0.6 cm wide, erect when short but becoming pendulous, dark green, leathery, glabrous. Sori linear; sporangia mixed with branching paraphyses with club-shaped terminal cells. Fertile plants: Jan., May, Oct.

Distribution. In tropical and subtropical regions from southern Africa and Asia to Australia (N.T., Qld) and New Guinea. Confined to the Top End of the N.T., with most collections from the Tiwi Islands but also from Channel Island and Nabarlek (p.78).

Habitat. A rainforest species mostly collected as an epiphyte but also in sheltered rock crevices.

Aspleniaceae

A cosmopolitan family with all *ca* 700 species placed in *Asplenium*, or mostly in *Asplenium*, and a number of small, segregate genera. Following Brownsey (1998a) two genera, *Asplenium* and *Pleurosorus*, are recognised in Australia.

Reference: Brownsey (1998a).

Key to genera of Aspleniaceae

- 1a. Fronds lacking hairs or sometimes with scattered short hairs; sori indusiate *Asplenium*
- 1b. Fronds manifestly hairy; sori lacking an indusium *Pleurosorus*

Asplenium L.

Plants terrestrial or epiphytic (not N.T.). Rhizome erect or creeping. Fronds monomorphic or dimorphic (not N.T.). Clathrate (latticed) scales present on rhizomes and fronds. Lamina simple to 5-pinnate; veins free or sometimes anastomosing. Sori elongate along veins and distant from margins of the lamina, indusiate; indusia elongate and attached to veins. Spores monolet, the surface often echinate or reticulate.

A cosmopolitan genus of about 650 species, with Brownsey (1998a) recognising 30 as occurring in Australia. Since his treatment, two taxa have been collected in the N.T., neither of which seem to belong to other species so far recognised as occurring in Australia. Peter Bostock (*in litt.*) has indicated that both are unlikely to prove to be new species but new records for Australia. He has also suggested which names may apply (see below) to the entities but studies of type specimens and thorough revision of the complexes to which they belong is required before names can be applied with certainty.

Key to species of *Asplenium*

- 1a. Pinnae mostly doubly serrate rather than pinnatifid, the largest *ca* 55 mm long; sori *ca* 0.3 mm wide *Asplenium* (Litchfield entity)
- 1b. Pinnae mostly pinnatifid, the largest *ca* 90 mm long; sori *ca* 1 mm wide *Asplenium* (Nabarlek entity)

Asplenium (Litchfield entity)

(Fig. 17E–G)

Ferns with erect to pendent fronds, the largest *ca* 1 m long. Stipe and rachis pale brown to dark reddish brown, with scattered reddish-brown scales; stipe to *ca* 2 mm diam. Lamina linear, 1-pinnate, to *ca* 80 cm long and 9 cm wide, dark green above, pale green below. Proliferous buds present. Pinnae to *ca* 120 per frond, ovate to lanceolate, 14–55 mm long, 8–15 mm wide, largest pinnae about the middle of the frond, all pinnae sessile or barely stalked, basally with equal to somewhat unequal lobes, margins mostly doubly serrate, the lowest tending to be once-serrate, and apically subobtusate to acuminate, glabrous or with scattered

scales. Sori 2–5.5 mm long, *ca* 0.3 mm wide. Fertile plants: Mar., Nov.

Distribution. Wangi Falls, Litchfield NP, N.T.(p.73).

Habitat. Rock faces of waterfall.

Notes. Peter Bostock (*in litt.*, 2002) has suggested that this entity may prove to be *A. longissimum* Bl., a fern otherwise known from south-east Asia (Holtum 1954). He also noted that the entity is in cultivation around Australia, particularly in Queensland.

Asplenium (Nabarlek entity)

(Fig. 17H)

Ferns with erect to pendent fronds, the largest *ca* 70 cm long. Stipe and rachis dark brown, scales scattered to obvious, especially on the rachis; stipe to *ca* 3 mm diam. Lamina linear, 1- or 2-pinnate, to *ca* 60 cm long and 17 cm wide. Proliferous buds not seen. Pinnae with the basal ones somewhat doubly serrate but most pinnatifid, ovate to lanceolate, 30–90 mm long, 12–15 mm wide, discolorous, the upper surface drying a darker brown than the undersurface, largest pinnae probably about the middle of the frond, all pinnae sessile and with scattered, branching scales; ultimate segments with the basal ones mostly manifestly unequal, apically serrate. Sori 1.5–5 mm long, *ca* 1 mm wide. Fertile plants: Oct.

Distribution. Near Nabarlek, N.T. (p.73).

Habitat. Rock crevices in a sandstone gorge.

Notes. Peter Bostock (*in litt.*, 2002) has suggested that this entity may prove to be *A. caudatum* G. Forst., a species otherwise known from south-east Asia and Polynesia (Holtum 1954).

Pleurosorus Fée

Plants lithophytic or terrestrial, with clathrate scales. Rhizome erect. Fronds monomorphic. Lamina 1- or 2-pinnate; veins free. Sori elongate along veins and distant from margins of the lamina, indusium absent. Spores monolet, ridged with a smooth surface.

Brownsey (1998a) referred three or four species to this genus, noting that there are major problems with both generic and species delimitation and that the distinction between the two taxa recognised here is likely to be artificial. Differences in spore size suggest that there may be two cytotypes within the complex but this seems not to correlate with the differences in hair type currently used to distinguish the taxa. As Brownsey noted, resolution of the problem requires study of the plants across their geographic range. I follow him and retain the current taxonomic treatment.

Key to species of *Pleurosorus*

- 1a. Indumentum of mostly or only eglandular hairs *P. rutifolius*
- 1b. Indumentum of stalked glandular hairs *P. subglandulosus*

Pleurosorus rutifolius (R. Br.) Fée

Blanket fern

Grammitis rutaefolia R. Br., Prodr. 146 (1810).

Pleurosorus rutifolius (R. Br.) Fée, Gen. fil. 180 (1852).

Type: Derwent, Risdon, Tas., *R. Brown Iter Austral.* 7; syn: BM, K.

Rhizome erect, with narrowly triangular scales. Fronds semi-erect, 5–13 cm long. Stipe and rachis with a dense indumentum of eglandular hairs, *ca* 0.5–1 mm long, occasionally a few stalked glandular hairs also present. Lamina 1- or 2-pinnate, mostly elliptic to narrowly elliptic, 4–8 cm long, 1.5–4 cm wide. Primary pinnae 7–15, ovate to widely ovate or sometimes elliptic or obovate, 7–20 mm long, 4–12 mm wide, basally equally or unequally cuneate, shortly stalked; margins entire or coarsely dentate, largest pinnae near the middle of the frond. Secondary pinnae 3–5 mm long. Sori 1–3.5 mm long. Fertile plants: Mar.–Nov.

Distribution. New Zealand and Australia (all states and territories), with localities in the N.T. including Palm Valley, Mt Gillen, and Emily, Jessie and Simpsons gaps (p.77).

Habitat. Rocky slopes.

Pleurosorus subglandulosus (Hook. and Grev.)

(Fig. 17I, J)

Blanket fern

Gymnogramma subglandulosa Hook. and Grev., *Icon. fil.* 1: pl. 91 (1828).

Pleurosorus subglandulosus (Hook. and Grev.) Tindal, *Victorian Naturalist* 73: 169 (1957).

Type: New Holland, *Fraser*; holo: K.

Rhizome erect, with narrowly triangular scales. Fronds semi-erect, 5–13 cm long. Stipe and rachis with a dense indumentum of stalked, glandular hairs, the largest *ca* 0.2 mm long. Lamina 1- or 2-pinnate, mostly elliptic to narrowly elliptic, 3–9 cm long, 1.5–3.5 cm wide. Primary pinnae 7–18, ovate to widely ovate or sometimes elliptic or obovate, 5–15 mm long, 2–13 mm wide, basally commonly unequally cuneate, shortly stalked; margins entire or coarsely dentate, largest pinnae near the middle of the frond. Secondary pinnae 3–5 mm long. Sori 1–6 mm long. Fertile plants: May–Nov.

Distribution. Australian endemic (W.A., N.T., S.A.). Localities in the N.T. include Giles Spring, Mt Winter, and Hugh and Ormiston gorges (p.77).

Habitat. Sheltered rocky areas, particularly areas with seepage.

Thelypteridaceae

A mainly tropical family with perhaps 30 genera and 1000 species (Australia ten genera and *ca* 22 species). *Ampelopteris*, *Sphaerostephanos* and *Christella* are sometimes included in *Cyclosorus* but, at least partly to maintain consistency with the *Flora of Australia*, they are retained here.

A sterile specimen of a species of this family has been collected from Humpty Doo (Wightman 1777). It has sessile orange glands and papery scales and as such will key to *Cyclosorus* in the following key but is clearly not of *C. interruptus*. The highly divided pinnae suggest that it is a species of *Thelypteris*. Attempts to relocate the taxon have failed, and as it may not be native it is not treated further.

References: Holttum (1981), Smith (1990), Bostock (1998b).

Key to genera of Thelypteridaceae

- 1a. Lamina 3-pinnatifid and with long, uniseriate, septate hairs on the lower surface *Macrothelypteris*
- 1b. Lamina 1-pinnate or 1-pinnatifid; long, uniseriate, septate hairs absent 2
- 2a. Sori lacking indusia *Ampelopteris*
- 2b. Sori with indusia 3
- 3a. Lower surface of pinnae lacking sessile, spherical glands *Christella*
- 3b. Lower surface of pinnae with sessile, spherical yellow, brown or orange glands 4
- 4a. Lower surface of costae with broad, papery scales *Cyclosorus*
- 4b. Lower surface of costae lacking broad, papery scales *Sphaerostephanos*

Ampelopteris Kunze

Rhizome creeping, scaly. Fronds 1-pinnate, of two types, those with terminal pinnae and those with indefinite apical growth and bearing axillary buds which develop into new fronds. Rachis with forked, unicellular hairs. Pinnae shallowly lobed; veins mostly anastomosing. Sori circular or oblong; indusium absent. Sporangia stalks bearing hairs which terminate in a globular gland.

Monotypic genus found in tropical regions from West Africa to New Caledonia.

Ampelopteris prolifera (Retz.) Copel.

(Fig. 18A)

Hemionitis prolifera Retz., Observ. bot. 6: 38 (1791).

Ampelopteris prolifera (Retz.) Copel., Gen. fil. 144 (1947).

Type: southern India, J.G. König; holo: GOET.

Rhizome short-creeping, ca 1 cm diam., densely scaly when young; scales ovate, brown, 1–2 mm long, 0.5–0.8 mm wide. Stipe and rachis with scattered scales and few to numerous and minute forked hairs. Lamina of fronds of indeterminate growth up to several metres long and with linear pinnae (not seen). Lamina of determinate growth with shortly stalked pinnae; pinnae lanceolate, 2–8 cm long, 0.5–1.8 cm wide, margins shallowly lobed, mostly glabrous except for scattered uniseriate hairs on the veins and margins and

occasionally with scattered, brown, scales; basally truncate or broadly cuneate and the basal lobes symmetrical or asymmetrical; margins shallowly lobed. Sori somewhat circular or oblong along the veins. Fertile plants: Sept., Oct.

Distribution. Tropical regions of West Africa east to Australia (W.A., N.T., Qld.) and New Caledonia. In the N.T. scattered throughout the northern half and occurring as far south as Siegal Creek (Calvert Hills Stn) (p.73).

Habitat. Riparian rainforest, springs, the edges of lagoons, and rainforest bordering on floodplains.

Christella H. Lév.

Rhizome creeping or erect; scales usually narrow and bearing superficial hairs. Fronds 1-pinnate, not bearing axillary buds. Pinnae lobed, commonly the 1–5 lower pairs of pinnae gradually decreasing in size towards the base of the frond, an acroscopic basal lobe often present; acrophores at base of pinnae not swollen; erect eglandular hairs and sometimes glandular hairs present on the lower surface but sessile spherical glands absent; usually at least the basal veins anastomosing. Sori subcircular or subreniform, indusiate. Sporangia stalks with unicellular, elongate, glandular hairs but distal regions lacking hairs. Spores tuberculate or ridged.

Genus of ca 50 species with all but one in the warmer parts of the Old World. Five species in Australia but only one in the N.T.

Christella deutata (Forssk.)

Brownsey and Jermy

(Fig. 18B, C)

Polypodium dentatum Forssk., Fl. aegypt.-arab. 185 (1775).

Christella deutata (Forssk.) Brownsey and Jermy, Brit. Fern. Gaz. 10: 338 (1973).

Type: Arabia, *P. Forsskål*; holo: C.

Rhizome short-creeping; scales triangular to narrowly triangular, reddish-brown. Fronds 20–90 cm long, pilose. Stipe 5–50 cm long, glabrous to hairy. Rachis hairy, hairs ca 0.2–0.6 mm long. Lamina ca 50 cm or more long, 1-pinnate, with 15–25 pairs of sessile pinnae. Pinnae narrowly triangular or lanceolate in outline, 2–10 cm long, 0.7–2.5 cm wide, mostly obtusely lobed about ½ to 2/3 the way towards the costa, the uppermost not lobed; basal pinnae progressively reduced towards the base of the frond and more widely spaced along the rachis than the upper pinnae, often with a prominent acroscopic basal lobes. Sori subreniform, mostly medial, 1–12 per pinna-lobe, each covered by a prominently hairy, thin indusium. Fertile plants: throughout the year.

Distribution. Widespread in subtropical and tropical regions of the Old World and in Australia in all mainland States; introduced in the New World. Most N.T.

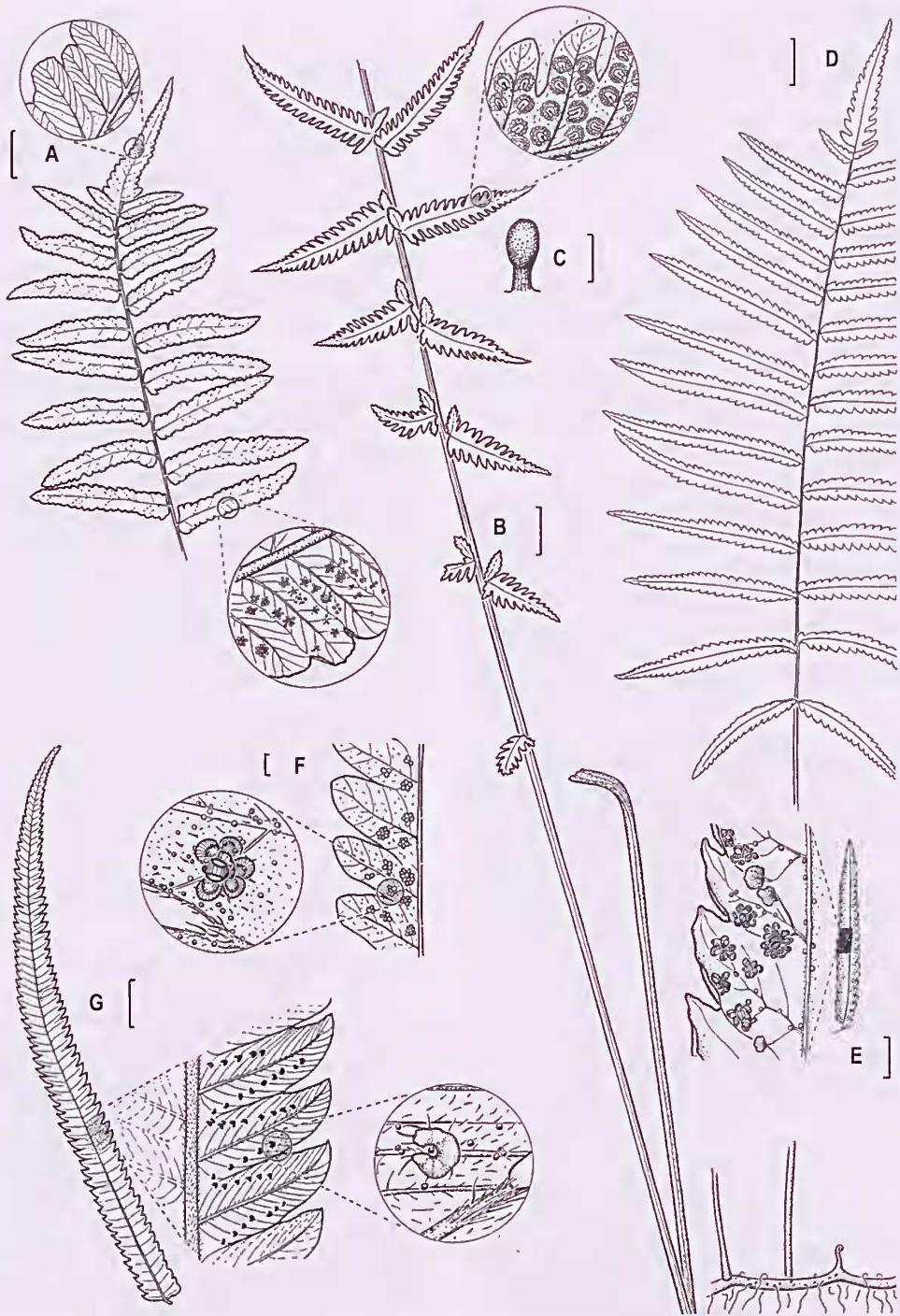


Fig. 18. A. *Ampelopteris prolifera*: upper part of frond, with enlargements showing venation and position of sori (Latz 10369). B, C. *Christella dentata*: B, basal part of frond with enlargement showing sori on the lower surface; C, stalked glandular hair from lower surface of pinna (B, C, Thomson 3542). D, E. *Cyclosorus interruptus*: D, frond and rhizome; E, enlargement of lower surface of pinna showing sori, scales and spherical glands (D, E, Meukhorst 852). F. *Sphaerostephanos heterocarpus*: lower surface of pinna with an enlargement showing spherical glands and a sori with the indusium almost obscured by the sporangia (Barritt 1235). G. *Sphaerostephanos unitus* var. *unitus*: pinna, with enlargements showing venation, position and shape of sori, and spherical glands (Russell-Smith 6151). Scale bars: D = 3 cm, A, B, G = 2 cm, F = 1 mm, C = 0.05 mm.

collections are from the northern region, with a single collection coming from Chewings Range in the south (p.74).

Habitat. Perennial seepage areas on rock faces and the edge of watercourses.

***Cyclosorus* Link**

Rhizome long-creeping. Fronds with lowest pinnae not markedly reduced, all pinnae lobed and with basal veins uniting and running to a sinus; under-surface with broad flat scales and orange to red spherical glands. Sori subreniform, indusiate. Sporangia devoid of hairs and glands on body but long hairs with terminal glands on sporangium-stalks. Spores closely and irregularly spinulose.

A pantropical genus with perhaps three species, with one in Australia.

***Cyclosorus interruptus* (Willd.) H. Itô**

(Fig. 18D, E)

Pteris interrupta Willd., Phytographia 13, t. 10, fig. 1 (1794).

Cyclosorus interruptus (Willd.) H. Itô, Bot. Mag. (Tokyo) 51: 714 (1937).

Type: southern India, *Klein*; **holo:** B (herb. Willdenow 19770).

Rhizome long-creeping, sparsely covered with scales. Fronds with lamina commonly 30–50 cm long, pinnae 15–25 pairs, the largest pinnae 9–13 cm long, 0.9–1.5 cm wide, under surface with orange glands, scattered scales and a sparse to dense indumentum of white eglandular hairs. Sori initially circular but often coalescing into rows. Indusia small and often inconspicuous, bearing hairs. Fertile plants: Apr.–Aug.

Distribution. Tropical and subtropical regions of Africa, Asia and Australia (W.A., N.T., Qld, N.S.W.). In the N.T. widespread in the Top End and also occurring in the southern region. Localities include Holmes Jungle, Mallapunyah Spring, North and Vanderlin Islands (Sir Edward Pellew Group) and the Daly River floodplain in the north and Kathleen Spring and Reedy Roekhole (George Gill Range) in the south (p.75).

Habitat. Commonly grows at permanent springs and in *Melaleuca* forest, but sometimes in swamps and on floating mats. Commonly in sandy or organic substrates.

***Macrothelypteris* (H. Itô) Ching**

Rhizome short and creeping, with narrow scales. Stipe with scales at the base. Fronds 2-pinnate to 3-pinnatifid. Rachis and costa with slender, multicellular, eglandular hairs and short capitate hairs. Pinna rachis not grooved on the upper surface. Pinnules mostly adnate to the rachis of the pinna; with slender, uniseriate, septate hairs and some short, glandular hairs; veins free and forking but not reaching the margins of the segments. Sori circular and not terminal on the veins;

indusium present. Sporangia with a few shortly stalked glandular hairs. Spores with a fine surface reticulum and slightly winged.

A genus of *ca* 10 species, with two in Australia but just *M. torresiana* in the N.T.

Macrothelypteris torresiana

(Gaudich.) Ching

(Fig. 19A, B)

Polystichum torresianum Gaudich. in Freyc., Voy. Uranie 8: 333 (1828).

Macrothelypteris torresiana (Gaudich.) Ching, Acta Phytotax. Sin. 8: 310 (1963).

Type: Marianas Island, *G. Gaudichaud-Beaupré*; **holo:** P, iso: G.

Rhizome to *ca* 1 cm diam. Fronds to 120 cm, pale green. Stipe to 50 cm long, its base persistent and covered with narrow, brown scales but otherwise smooth. Lamina deeply 3-pinnatifid, to 70 cm long and 50 cm wide; subbasal pinnae the longest, to 20 cm long; ultimate segments to 20 mm long and 5 mm wide; the aciculate, white hairs 0.5–1.2 mm long. Sori *ca* 1 mm diam, each with *ca* 15–20 sporangia; indusium small and often obscured by mature sporangia. Fertile plants: Sept.

Distribution. From the Mascarene Islands east to Australia (W.A., N.T., Qld, N.S.W.) and islands in the Pacific. In the N.T. only known from a single specimen, *Trainor 184*, collected at Camel Creek, on Wollagorang Station (p.76).

Habitat. The only collection was obtained from around a small spring and cliffline seepage along Camel Creek gorge.

Note. As the single specimen consists only of part of a fertile frond this description is partly based on that presented by Holttum (1977).

***Sphaerostephanos* J. Sm.**

Rhizome creeping or erect; scales bearing acicular hairs. Fronds 1-pinnate, not bearing axillary buds. Pinnae lobed, the lower pairs of pinnae abruptly decreasing in size towards the base of the frond; lower surface usually with antrorse acicular hairs and also with sessile, orange or yellow, spherical glands; usually at least 1 pair of basal veins anastomosing. Sori subreniform, indusiate, confined to lobes of pinna, in slight depressions. Sporangia often with yellow glands distally, sometimes with bristles, often the stalk with gland-tipped hairs. Spores usually with small wings.

A genus of *ca* 180 species which extends from east Africa through Asia to the Pacific, with one species reaching Tahiti. Two species in Australia.

Key to species of *Sphaerostephanos*

- 1a. Rhizome erect, plants growing in forests
..... *S. heterocarpus*
- 1b Rhizome long-creeping, plants growing in
swampy places *S. unitus*

***Sphaerostephanos heterocarpus* (Blume) Holttum**
(Fig. 18F)

Aspidium heterocarpum Blume, Enum. pl. Javae 155 (1828).

Sphaerostephanos heterocarpus (Blume) Holttum in M.P. Nayar and S. Kaur, Comp. Beddome's Handb. Ferns Brit. India 209 (1974).

Type: foot of Mt Boerangrang, Java, C.L. Blume; holo: L.

Rhizome erect, to 20 cm tall, sometimes branching from the base. Fronds to 60 cm long. Stipe to 30 cm long, with a dense indumentum of minute, stiffly erect hairs. Lamina somewhat triangular in outline, to ca 30 cm long, the basal pinnae much reduced and less than ca 10 mm long, the mid-pinnae to ca 9 cm long, 1.5 cm wide. Largest pinnae 7–9 cm long, 1–1.5 cm wide, lobed to ca $\frac{3}{4}$ of the way to the costa; lower surface between the veins with numerous sessile, spherical yellow glands plus short erect hairs. Sori with the indusium with stiffly erect hairs and spherical glands. Fertile plants: May.

Distribution. Thailand to Hong Kong, Solomon Islands, Vanuatu, Samoa, Australia (N.T., Qld) and Fiji. In the N.T. only known from the Fitzmaurice River (p.78).

Habitat. Sandstone gorges.

Notes. Due to a paucity of specimens this description is partly based on Bostock (1998b).

***Sphaerostephanos unitus* (L.) Holttum**
var. *unitus*
(Fig. 18G)

Polypodium unitum L., Syst. nat. 10th ed., 2: 1326 (1759).

Sphaerostephanos unitus (L.) Holttum, J. S. African Bot. 40: 165 (1974).

Type: locality unknown; holo: LINN.

Rhizome long-creeping, ca 5 mm diam. Fronds to ca 100 cm long. Stipe 30–60 cm long, brown, glossy. Lamina somewhat ovate in outline, 20–60 cm long, the lower pairs abruptly decreased to auricles. Largest pinnae 10–21 cm long, 0.8–1.8 cm wide, lobed to ca $\frac{1}{3}$ of the way to the costa; lower surface with sessile, spherical brown or orange glands and erect, whitish, uniseriate hairs. Sori with the indusium glabrous or with stiffly erect hairs and spherical glands. Fertile plants: Oct.

Distribution. East Africa to India, Malesia, Australia (N.T., Qld), Philippines and Guam. In the N.T. only known from Green Ant Springs (p.78).

Habitat. Spring jungle.

Notes. Due to a paucity of specimens this description is partly based on Bostock (1998b).

Blechnaceae

Cosmopolitan family with eight genera; four genera and 29 species in Australia.

References: Andrews (1990), Kramcr *et al.* (1990), Chambers and Farrant (1998b).

Key to genera of Blechnaceae

- 1a. Small ferns with weakly erect fronds and non-leathery pinnae; indusium present *Doodia*
- 1b. Robust ferns with leathery pinnae; indusium absent or present 2
- 2a. Erect, non-climbing fern; fertile and sterile lamina similar *Blechnum*
- 2b. Scrambling or climbing fern; fertile and sterile lamina markedly dissimilar *Stenochleana*

***Blechnum* L.**

Rhizome creeping, climbing or erect and sometimes forming a small trunk, scaly, with the scales basally attached and often very dark. Fronds similar or dimorphic (not N.T.). Lamina commonly pinnate or pinnatifid but sometimes simple or lobed, somewhat leathery. Sori in linear rows on each side of the costa and sometimes (not N.T.) covering the surface of the pinnae. Indusium present. Spores with surface ornamentation, a perispore absent or present.

A mostly Southern Hemisphere genus with ca 150–200 species; 18 species in Australia.

Key to species of *Blechnum*

- 1a. Basal pinnae not reduced to auricles; margins of pinnae serrate *B. indicum*
- 1b. Lowermost pinnae abruptly reduced to auricles; margins of pinnae entire *B. orientale*

***Blechnum indicum* Burm.f.**
(Fig. 20A, B)

Swamp water fern

Blechnum indicum Burm.f., Fl. indica 231 (1768).

Type: Evans Head, N.S.W., R.G. Coveny 4712; neo: NSW, *fide* T.C. Chambers and P.A. Farrant, Fl. Australia 48: 710 (1998); isoneo: A, AD, BM, BRI, G, K, L, LE, TNS, UC.

Rhizome creeping, branched; scales lanceolate, to ca 5 mm long, dark reddish brown throughout or the margins paler. Fronds to 1 m or more long, fertile and sterile fronds similar. Stipes glabrous except for basal scales. Lamina 1-pinnate, with ca 30–80 pinnae, glabrous except for reddish brown costal scales; pinnae sessile, lanceolate or linear-lanceolate or smaller ones somewhat ovate, 1.5–16 cm long, 0.4–1.8 cm wide, margins finely serrate, the basal pinnae similar or slightly shorter than the upper ones. Indusium linear. Fertile plants: probably throughout the year.

Distribution. From south-east Asia to Australia (W.A., N.T., Qld, N.S.W.) and Polynesia. In the N.T. extending as far south as Vanderlin Island (p.73).

Habitat. Common in freshwater swamps and spring jungle and recorded from freshwater seepage areas behind mangroves.

Ethnobotany. Aborigines eat the rhizome after it has been cooked and hammered (Wightman and Smith 1999).

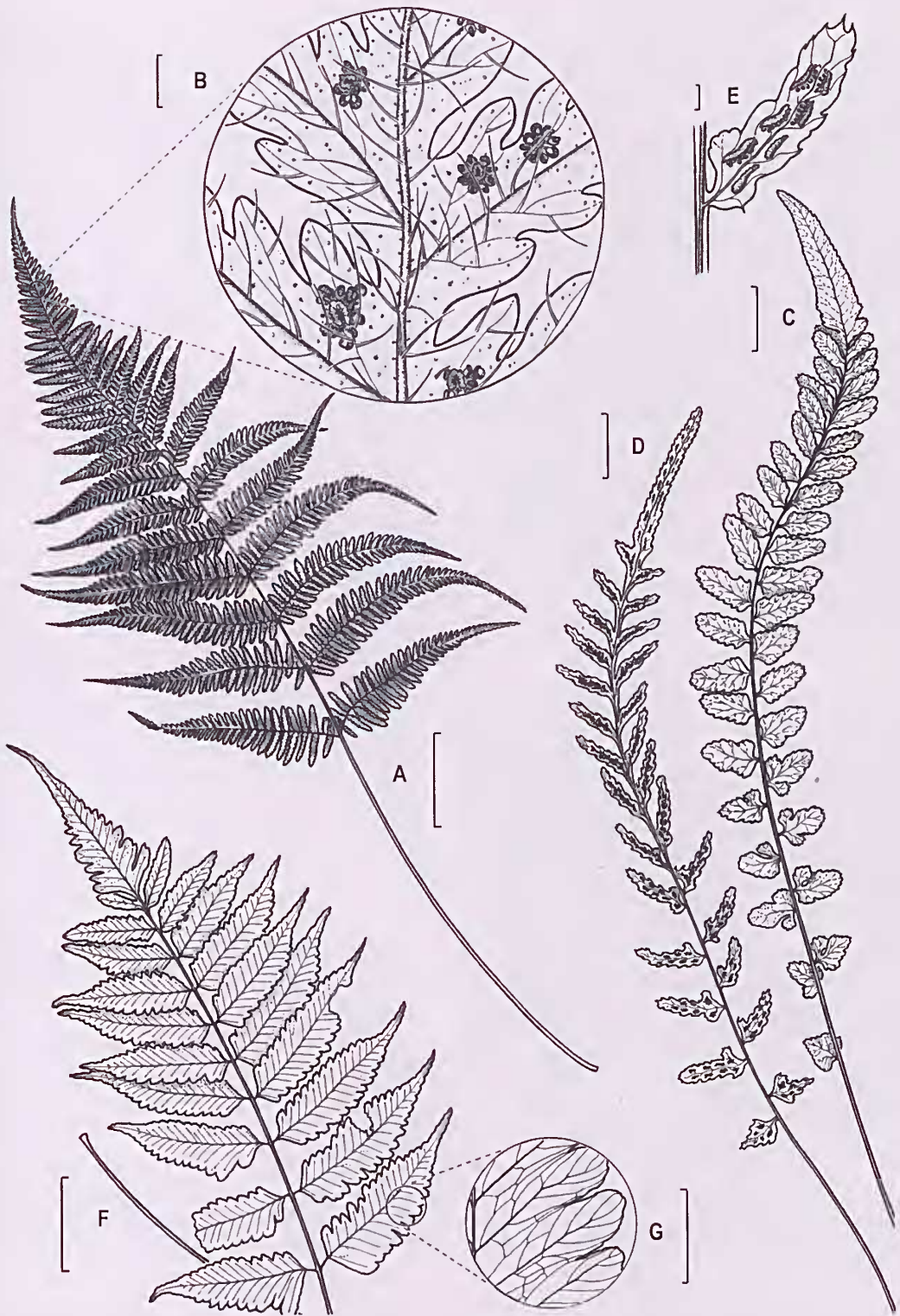


Fig. 19. A, B. *Macrothelypteris torresiana*: A, frond; B, lower surface of frond (A, B, Trainor 184). C-E. *Doodia caudata*: C, sterile frond; D, fertile frond; E, fertile pinna showing sori (C-E, Latz 6622). F, G. *Bolbitis quoyana*: F, upper part of sterile frond; G, part of sterile pinna showing venation (F, G, Brennan 1157). Scale bars: A, F = 5 cm, C, D, G = 1 cm, B, E = 1 mm.

***Blechnum orientale* L.**

(Fig. 20C, D)

Blechnum orientale L., Sp. pl. 2: 1077 (1753), as *B. occidentale* L. in error; corrected in 2nd ed., 2: 1535 (1763).

Type: China, *P. Osbeck*; holo: LINN.

Rhizome forming a short, erect trunk with a densely scaly apex; scales subulate, brown or reddish brown, shiny, *ca* 15–20 mm long, margins entire or toothed. Fronds 30–200 cm long, fertile and sterile fronds similar. Stipes glabrous except for basal scales. Lamina 1-pinnate, with *ca* 30–70 pinnac, glabrous or with some scales and irregular hairs on the rachis and costae; pinnae sessile and the upper ones adnate to the rachis, most pinnac linear-lanceolate, 5–30 cm long, 0.5–2.3 cm wide but the lowermost abruptly reduced to rounded auricles, margins entire. Indusium linear. Fertile plants: throughout the year.

Distribution. Nepal to Japan, Indonesia, northern Australia (W.A., N.T., Qld) and Pacific islands (p.73).

Habitat. Common fern along creeklines and on the edges of springs and waterholes and in rock crevices with permanent seepage.

Ethnobotany. Aborigines eat the rhizome after it has been cooked and hammered (Wightman and Smith 1999).

***Doodia* R. Br.**

Rhizome erect or creeping, with dark brown or black scales. Fronds monomorphic (not N.T.) or dimorphic. Sterile lamina 1-pinnate, the pinna closely spaced; pinna margins sharply toothed. Fertile lamina 1-pinnate, the pinnae widely spaced; veins forked. Sori borne on anastomoses and in one or more, discrete or subcontinuous rows parallel to the midvein of the pinna. Indusium present. Spores smooth.

A genus ranging east from Sri Lanka to Australia, New Guinea, New Zealand, Pitcairn and Easter Islands; with *ca* 30 taxa. Artificial hybrids are easily obtained and the considerable morphological variation and possible natural hybridisation makes species delimitation difficult. Following Parris (1998) there are eight species in Australia, with one in the N.T. which seems to be referable to *D. caudata*.

Reference: Parris (1998).

***Doodia caudata* (Cav.) R. Br.**

(Fig. 19C–E)

Small rasp fern

Woodwardia caudata Cav., Descr. pl. 264 (1801).

Doodia caudata (Cav.) R. Br., Prodr. 151 (1810).

Type: Nova Hollandia, *L. Née*; holo: MA.

Rhizome erect. Fronds 5–20 cm long, stipes and rachises with an indumentum of numerous uniseriate, eglandular hairs 0.2–0.4 mm long; pinnae not or very rarely lobed to their midveins. Sterile fronds with the lateral pinnae shortly stalked to sessile, very widely

ovate to ovate or elliptic, 3–16 mm long, 2.5–7 mm wide, weakly or obviously 2-lobed in the basal half but rarely incised to more than ¼ of the way to the costa, with scattered hairs, margins sharply and coarsely toothed. Fertile fronds with the pinnae often oblong or lanceolate and narrower than those in sterile fronds but the lower pinnae often similar and sometimes all similar in shape to those of the sterile fronds. Sori *ca* 3–9 per pinna, 0.8–1.7 mm long, the indusium hairy, at maturity the sori distinct or confluent along and across the costa. Fertile plants: June, July.

Distribution. Australian endemic (N.T., S.A., Qld, N.S.W., Vic., Tas.). Found in southern N.T., e.g. at Giles Spring (p.75).

Habitat. Damp sheltered areas in rocky gullies and crevices on the edge of permanent springs.

Notes. A highly variable taxon in which fronds are not strictly dimorphic and in which sori may or may not be confluent. According to Parris (1998), specimens with distinct sori are from shaded areas.

***Stenochlaena* J. Sm.**

Rhizome scrambling or climbing, scaly when young. Fronds dimorphic. Sterile lamina 1-pinnate, pinnae usually alternate, sessile or almost so, all except the terminal pinna articulated at the rachis, margins serrate; veins numerous, close, parallel. Fertile lamina 1- or (not in Australia) 2-pinnate, linear, articulate. Sori continuous on each side of the costa, except for a narrow marginal band the undersurface of the pinnae covered by the sporangia. Indusium absent. Spores with surface ornamentation, perispore absent.

An Old World genus of six species, with one in Australia.

Stenochlaena palustris

(Burm.f.) Bcdd.

(Fig. 20E–G)

Polypodium palustre Burm.f., Fl. indica 234 (1768).

Stenochlaena palustris (Burm.f.) Bcdd., Suppl. ferns S. India 26 (1876).

Type: ‘habitat in Indiis’.

Rhizome long, climbing or scrambling, to *ca* 7 mm diam.; scales round, peltately attached. Fronds dimorphic, *ca* 25–150 cm long, smooth, shiny. Stipes *ca* 10–80 cm long, glabrous or with some peltate scales when young. Sterile pinnae to 35 or more per frond, ovate to lanceolate, 7–18 cm long, 1.5–4.5 cm wide, shortly stalked, serrate. Fertile pinnac to *ca* 19 or more per frond, linear, 6–22 cm long, *ca* 0.3 cm wide. Fertile plants: throughout the year.

Distribution. India to northern Australia (W.A., N.T., Qld) and Polynesia (p.78).

Habitat. A species of permanently wet monsoon forest, scrambling over rockfaces or climbing up trees. Also commonly gathered from the edge of *Melaleuca* swamps.



Fig. 20. A, B. *Blechnum indicum*: A, frond (Michell 1577); B, lower surface of fertile pinna (Dunlop 6561). C, D. *Blechnum orientale*: C, lower part of frond showing pinnac reduced to auricles; D, lower surface of fertile pinna (C, D, Latz 10885). E-G. *Stenochlaena palustris*: E, sterile frond; F, fertile frond; G, pinna from sterile frond showing venation (E-G, Jones 1393). H. *Tectaria siifolia*: plant (Dunlop 7274). Scale bars: E, F = 5 cm, H = 3 cm, A-D, G = 1 cm.

Dryopteridaecae

Cosmopolitan family of *ca* 29 genera and more than 1000 species. In Australia nine genera (one introduced) and 30 species. Aspidiaceae, an earlier but illegitimate family name, is used in some literature.

Within the N.T. the family is only definitely represented by the genus *Tectaria*. There is a specimen of *Polysticum proliferum* (R. Br.) C. Presl held at DNA which is labelled as coming from Reedy Creek in the George Gill Range. However, I here consider this to be an incorrectly labelled specimen. Not only has it been collected just once, which seems unlikely for such a distinctive fern, the species is otherwise known only from montane forests of south-eastern Australia.

References: Andrews (1990, as Aspidiaceae), Jones (1998c), Bostock (1998c).

Tectaria Cav.

Rhizome creeping or erect, with rigid, opaque, usually thin and entire scales. Fronds monomorphic or dimorphic. Lamina commonly at least 1-pinnate and often with basal pinnae with basiscopic lobes or pinnules; veins free or anastomosing to form areoles; reddish articulated hairs usually present. Costae and costules usually ridged on the upper surface and covered with reddish, articulated hairs, sometimes glabrous. Sori usually with reniform or peltate indusia. Spores usually cristate.

Pantropical genus with *ca* 150 species; four species in Australia but just *T. siifolia* in the N.T.

References: Andrews (1990), Bostock (1998c).

Tectaria siifolia (Willd.) Copel.

(Fig. 20H)

Polypodium siifolium Willd., Sp. pl. 5(1): 196 (1810).

Tectaria siifolia (Willd.) Copel., Philipp. J. Sci., C 2: 414 (1907).

Type: Java, *L. Ventenat*; holo: B (Herb. Wildenow 19689).

Rhizome creeping, short; scales narrowly triangular, 3–5 mm long, margins pale and initially fringed with hairs. Fronds dimorphic. Stipes of sterile fronds 20–30 cm long, longer in fertile fronds, all fronds with basal scales. Lamina of sterile fronds 1-pinnate, with 1–3 pairs of pinnae, the entire lamina *ca* 15–23 cm long, as wide or wider than long, papery, with a few hairs on the rachis, the basiscopic lobe of the basal pinnae to 15 cm long and 3.5 cm wide; fertile lamina smaller in all parts and veins forming fewer areoles. Sori circular, in several rows on each side of the costa. Indusium small, only on immature sori. Fertile plants: not seen.

Distribution. Christmas Island, Malesia and Australia (N.T., Qld). In the N.T. only known from the Arafura Swamp region (p.78).

Habitat. Dense, spring-fed rainforest.

Notes. This description is largely based on Bostock (1998c), the single specimen in DNA lacking fertile fronds.

Lomariopsidaecae

A pantropical family with eight genera; four genera and six species in Australia.

Reference: Jones (1998d).

Bolbitis Schott

Ferns terrestrial. Rhizome short to long-creeping, densely scaly; scales peltately attached or attached at with cordate bases and attached at the base, dark. Fronds dimorphic. Stipes in 2–6 longitudinal rows and decurrent on the rhizome. Lamina 1-pinnate, that of the fertile fronds usually smaller than the sterile fronds and with a longer stipe and narrower pinnae. Pinnae with the veins anastomosing on either side of the midrib. Sporangia borne over most of the lower surface of fertile pinnae; sori naked.

A pantropical genus with more than 40 species, with two (one endemic) recorded for Australia.

Bolbitis quoyana (Gaudich.) Ching

(Fig. 19F, G)

Acrostichum quoyanum Gaudich. in Freye., Voy. Uranie 8: 306 (1828).

Bolbitis quoyana (Gaudich.) Ching in C. Christ., Index filic. suppl. 3, 49 (1934).

Type: Mollucas, *C.L. Blume*.

Sterile fronds to *ca* 60 cm long. Stipe, rachis and base of costa with scattered, latticed, brown or reddish brown scales. Lamina 1-pinnate except for pinnatifid apex, 18.5–32 cm long, 12.5–18.5 cm wide. Pinnae longest towards the base of the lamina, mostly on stalks to 4 mm long but the uppermost 1 or 2 pairs with decurrent bases, basally symmetrical or asymmetrically lobed, apically rounded or somewhat tapering to the apex, margins shallowly to deeply lobed for much of their length, glabrous throughout; veins tending to form 2 or more rows on either side of the midrib, when ending in a sinus often forming a small bristle. Fertile plants: not seen.

Distribution. Malesia to Australia (N.T., Qld) and Fiji. In the N.T. known only from sterile collections (*Brennan 1157, Russell-Smith 8903*) from Dinner Creek, Kakadu NP (p.74).

Habitat. Shaded rock faces and overhangs along perennially wet creek.

Notes. The above description is necessarily brief due to the absence of fertile material.

Kym Brennan (pers. comm.) recorded in August 2003 that the single population consists of *ca* 200 individual plants and that plants are sometimes lost from scouring of the rocks by flood waters.

Davalliaceae

Circumscription of the family has varied widely. Following Bell (1998) it contains nine genera and *ca* 200 species of which four genera and 15 species are native to Australia. Only *Nephrolepis* definitely occurs in the N.T. There is also a questionable record of *Davallia solida* (G. Forst.) Sw. occurring on Groote Eylandt. No specimen of the latter is housed in DNA and as the record is dubious, being based on a cultivated specimen said to have been sourced from that locality, it is not treated further.

References: Andrews (1990), Bell (1998).

***Nephrolepis* Schott**

Ferns epiphytic or terrestrial. Rhizome short, decumbent to erect, densely scaly and bearing stolons; stolons wiry, with both scales and hair-like processes. Fronds in tufts, simply pinnate, monomorphic or dimorphic. Stipes much shorter than lamina, not articulated to rhizome, grooved on the upper surface. Pinnae articulated to rachis, margins entire, crenate or shortly lobed, often with a single large lobe at the base and on the upper side; veins on upper surface of pinnae with prominent hydathodes. Sori superficial (non-marginal) or marginal. Indusium usually reniform or circular, sometimes elongate. Spores tuberculate or rugose.

A genus of perhaps 25–30 species; pantropical and with greatest diversity in south-east Asia but also in temperate areas.

Delimitation of species is often difficult and Bell, with reservation, accepted six species for Australia and five for N.T. Not all are accepted here. Variation in pinna shape and the position of sori is such that specimens variously treated in Australian floras under the names *N. arida*, *N. biserrata*, *N. oblitterata* and *N. hirsutula* are here considered to belong to the one variable species, *N. hirsutula*. Identification is also made difficult by the fact that immature and mature fronds may differ in size, shape of the pinnae and the indumentum of the rachises, e.g. as in Jones 1344, a form of *N. hirsutula*.

References: Verdcourt (1996), Bell (1998).

Key to species of *Nephrolepis*

- 1a. Sori marginal; indusium elongate; margins of pinnae entire *N. acutifolia*
- 1b. Sori non-marginal; indusium reniform; margins of pinnae at least partly toothed *N. hirsutula*

***Nephrolepis acutifolia* (Desv.) H. Christ.**

(Fig. 21A)

Lindsaea acutifolia Desv., Mém. Soc. Linn. Paris 6(3): 312 (1827).

Nephrolepis acutifolia (Desv.) H. Christ, Verh. Naturf. Ges. Basel 11: 243 (1896).

Type: not designated.

Stolons and stipes with linear-triangular, red-brown scales with entire or sparsely toothed margins. Fronds to *ca* 2m long, pendent, with very narrow scales with basal processes. Pinnae closely spaced, margins entire or very slightly undulate, basally truncate and with somewhat rounded corners, sometimes with a basal, acroscopic lobe, with scattered septate eglandular and glandular hairs and scales but at least the latter lost with age. Sterile pinnae ovate to lanceolate, 10–55 mm long, 4–15 mm wide, apex rounded to somewhat acute. Fertile pinnae ovate to lanceolate, 15–38 mm long, 4–11 mm wide, apex usually acute. Sori marginal and elongate. Fertile plants: probably throughout the year.

Distribution. Tropical Africa through Asia to Polynesia. Uncommon in Australia (N.T., Qld). In the N.T. it occurs from central Arnhem Land to Groote Eylandt (p.76).

Habitat. Sandstone country, with plants growing in crevices of rock faces and amongst boulders in rainforest, the latter often dominated by *Allosyncarpia ternata*.

***Nephrolepis hirsutula* (G. Forst.) C. Presl**

(Fig. 21B–I)

Polypodium hirsutulium G. Forst., Fl. ins. austr. 81 (1786).

Nephrolepis hirsutula (G. Forst.) C. Presl, Tent. pterid. 79 (1836).

Type: not designated.

Nephrodium oblitteratum R. Br. Prodr. 148 (1810).

Nephrolepis oblitterata (R. Br.) J. Sm., in J. Bot. (Hooker) 4: 197 (1841).

Type: “(T.) B.”, i.e. tropical coast of Australia by Brown and earlier by Banks.

Aspidium biserratum Sw., J. Bot. (Schrader) 1800 (2): 32 (1801).

Nephrolepis biserrata (Sw.) Schott, Gen. fil. 1: t. 3 (1834).

Type: Mauritius, C.F. Grondahl; holo: S.

Nephrolepis arida D.L. Jones, Austrobaileya 2: 474, fig. 3d–f (1988), syn. nov.

Type: Talliputta Gorge, 17 July 1984, D.L. Jones 1598; holo: DNA; iso: AD, BRI, CANB, K, MEL, NSW.

[*Nephrolepis cordifolia* auct. non (L.) C. Presl: Chippend., Proc. Linn. Soc. New South Wales 96: 217 (1972); Dunlop (ed.), Checklist Vasc. Pl. Northern Terr. 2 (1987).]

Stolons and basal part of stipes with scales; scales lanceolate, brown or red-brown, the margins usually pale and with few to many cilia. Fronds *ca* 25–250 cm long, arching to erect, rachis glabrous or with scales or scale-like hairs with basal processes and/or uniseriate, septate hairs. Pinnae closely spaced, ovate to linear-lanceolate or somewhat oblong, mature pinnae 1–17 cm long, 0.4–2.8 mm wide, margins toothed for at least part of their length, basally truncate and with somewhat rounded corners, with or without 1 or 2

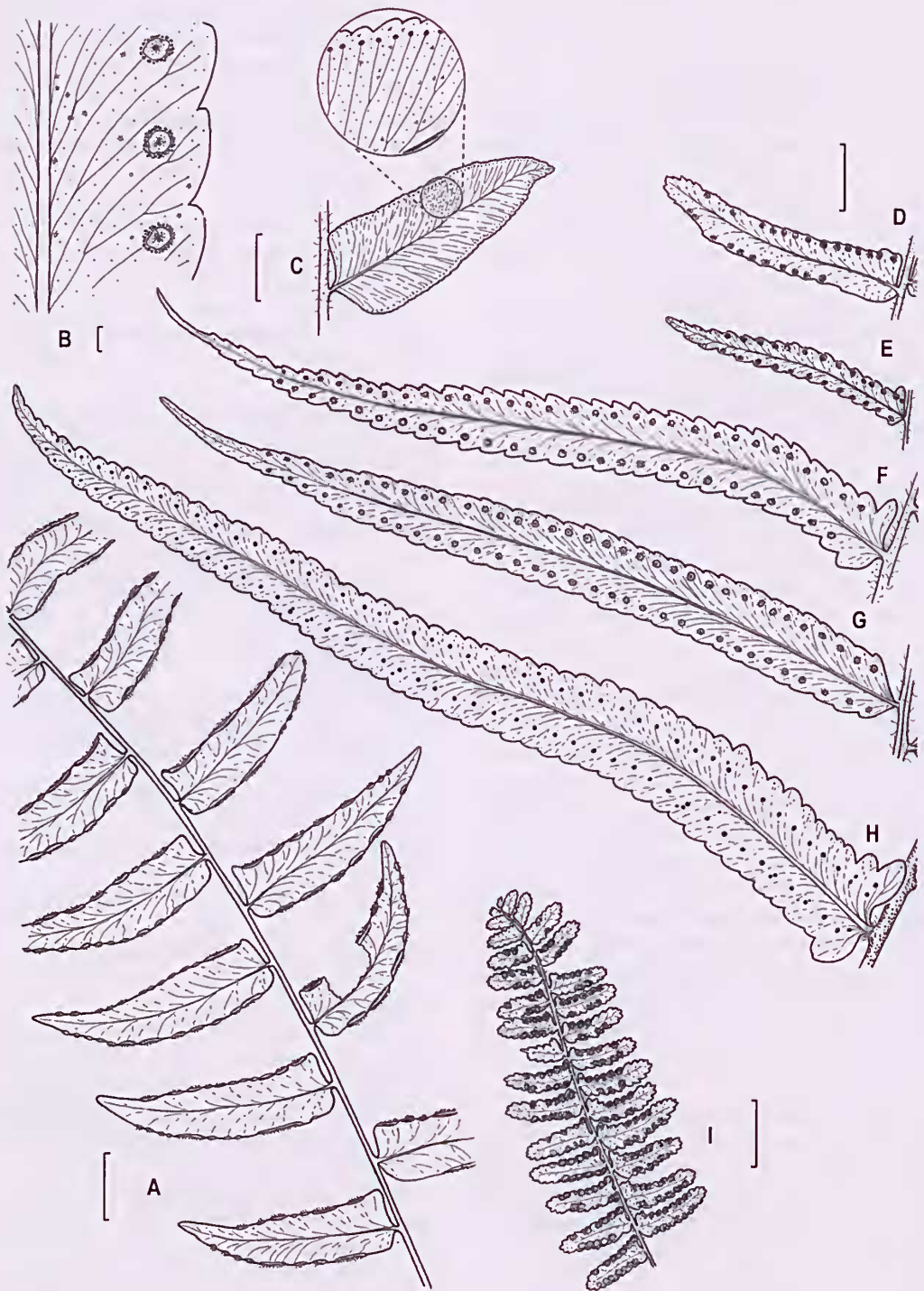


Fig. 21. A. *Nephrolepis acutifolia*: undersurface of part of fertile frond showing marginal sori (Jones 1420). B-I. *Nephrolepis hirsutula*: B, part of pinna showing typical venation pattern and position of sori at the end of veins (Jones 1699); C, lower sterile pinna with enlargement showing hydathodes on vein endings (Brennan 1571); D-H, fertile pinnae showing variation in their size and shape and the placement of sori, D (Thomson 3034), E, F (both from a single plant of Jones 1453), G (Jones 1699), H (Barritt 1230); I, fertile pinna of extreme form previously attributed to *N. arida* (Carr 2921). Scale bars: A, C-I = 1 cm; B = 1 mm.

barely formed to conspicuous auricles, apex obtuse to acute, with an indumentum of septate hairs and scattered scales. Sori submarginal to *ca* midway between the margin and the midrib. Fertile plants: throughout the year.

Distribution. Apparently pantropical (Australia: W.A., N.T., Qld) (p.76).

Habitat. In rainforest and on rocky sandstone slopes with permanent or near-permanent water.

Notes. Bell (1998), obviously with some reservation, recognised *N. biserrata*, *N. hirsutula* and *N. oblitterata* as distinct species. On the assumption that all three entities are indeed represented in the N.T., their maintenance as distinct species is untenable. Key features used to distinguish taxa – the shape of pinnae and the placement of sori – are extremely variable, even sometimes on the one plant (e.g. *Jones 1453*, fig. 21, E-F). The range of variation in specimens attributed by Jones to *N. arida* is such that it too is best placed in synonymy under *N. hirsutula*. Some specimens from the type locality and from Jasper Gorge (e.g. *Carr 2921*, fig. 21 1), by virtue of their generally smaller mature pinnae, are distinctive but nonetheless seem to merge with others forms.

Ethnobotany. Aboriginal people are known to eat both raw and cooked rhizomes (Wightman and Smith 1999).

Polypodiaceae

As treated by Bostock and Spokes (1998b), this is a family of 20–50 genera and *ca* 1000 species, with 11 genera and 28 or 29 species in Australia. Only two species are found in the N.T.

References: Andrews (1990), Hennipman *et al.* (1990), Bostock and Spokes (1998b).

Key to genera of Polypodiaceae

- 1a. Sterile, shallowly-lobed nest fronds present at the base of plants; fertile fronds 1-pinnatifid and much longer than nest fronds *Drynaria*
- 1b. Sterile nest fronds absent; fertile fronds 1-pinnatifid or simple *Microsorium*

Drynaria (Bory) J. Sm.

Plants epiphytic, lithophytic or terrestrial. Rhizome long-creeping, branched, densely scaly; scales usually peltately attached at the base, margins toothed or ciliate. Fronds dimorphic, with sterile, humus-collecting, nest fronds at the base and longer, pinnate or pinnatifid foliage fronds. Nest fronds shallowly-lobed, becoming papery and commonly bearing scales or stellate hairs. Foliage fronds with pinnae articulated to the rachis or the entire lamina articulated down each side of the rachis; veins mostly prominent, anastomosing, forming areoles; nectaries present. Sori circular or oblong to linear, in one row on either side of the primary vein or in one or two rows on each side of secondary veins. Spores smooth or tuberculate.

About 15 or more species ranging from Africa to Asia, Australia and Polynesia. Especially diversified in China. Four species in Australia but only *D. quercifolia* in the N.T.

Drynaria quercifolia (L.) J. Smith

(Fig. 22A–C)

Oakleaf fern

Polypodium quercifolium L. Sp. pl. 2: 1087 (1753).

Drynaria quercifolia (L.) J. Smith, J. Bot. (Hooker) 3: 398 (1841).

Type: locality and collector unknown; holo: LINN 1251.12.

Rhizome appearing woolly, the ginger or brown, soft, long-tapering scales 3–25 mm long and with ciliate margins. Nest fronds ovate, 6.5–30 cm long, 4.5–22 cm wide, shallowly to deeply lobed; lobes with round apices; venation prominent. Foliage fronds 30–100 cm long; stipes shorter than the lamina; lamina pinnatifid, pinnae lanceolate to linear-lanceolate, 6–24 cm long, 1–3.5 cm wide; veins reticulate between the main veins. Sori circular, scattered over the entire surface and tending to be in two rows between the lateral veins extending from the costa. Fertile plants: throughout the year.

Distribution. Sri Lanka east to northern Australia (W.A., N.T., Qld) and New Britain (p.75).

Notes. Commonly growing on rocks in shady gullies and on tree trunks in rainforest.

Ethnobotany. Aboriginal people eat roasted rhizomes (Wightman and Smith 1999).

Microsorium Link

Plants epiphytic, lithophytic or terrestrial. Rhizome creeping, scaly; scales latticed, peltate or pseudopeltate. Fronds monomorphic or more rarely dimorphic (but lacking humus-collecting, nest fronds). Stipes articulated to short stalks which occur at intervals along the rhizome. Lamina simple, regularly or irregularly lobed or pinnatifid; veins anastomosing, forming areoles and with veinlets ending in hydathodes. Sori conspicuous, usually circular or elongated, in regular or irregular rows or sometimes scattered. Spores hyaline or yellowish, smooth or tuberculate.

A genus centred in Asia and containing perhaps 50 or more species; eight species in Australia but only *M. grossum* in the N.T.

Microsorium grossum (Langsd. and Fisch.)

(Fig. 22D–H)

Polypodium grossum Langsd. and Fisch., Icon. fil. 9, t. 8 (1810).

Microsorium grossum (Langsd. and Fisch.) S.B. Andrews, Ferns Queensland 280 (1990).

Type: Marquesas Island; holo: LE, *fide* E. Schelpe, Contr. Bolus Herb. 1: 100 (1969).

[*Microsorium scolopendria* auct. non (Burm.f.) Copel.: Chippend., Proc. Linn. Soc. New South Wales 96: 217 (1972).]

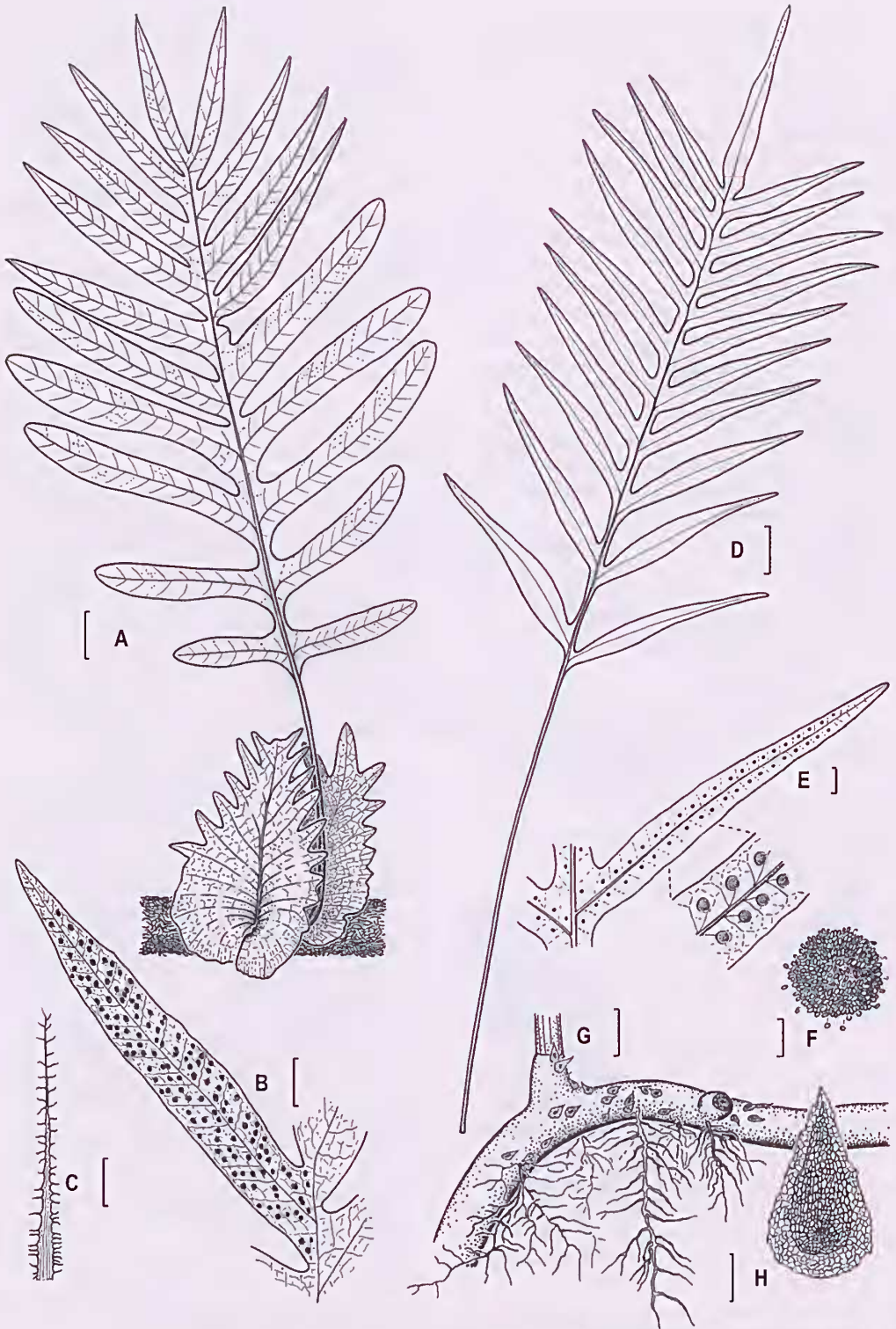


Fig. 22. A-C. *Drynaria quercifolia*: A, plant with foliage fronds and basal nest fronds (Dunlop 3316, Jones 1498); B, pinna with sori (Scarlett 314); C, rhizome scale (Dunlop 3316). D-H. *Microsorium grossum*: D, frond; E, fertile pinna with sori; F, sorus (D-F, Dunlop 5909); G, rhizome; H, rhizome scale (G, H, Russell-Smith 3472). Scale bars: D = 6 cm, A = 3 cm, B, E, G = 1 cm, C, F, H = 1 mm.

Plants terrestrial or sometimes lithophytic. Rhizome long-creeping, scaly when young; scales 2–4 mm long, brown, peltately attached, margins toothed, apex acute to acuminate. Fronds usually uniform and 1-pinnatifid but sometimes simple, *ca* 20–200 cm long. Stipes glabrous or with some basal scales, *ca* the length or shorter than the lamina. Lamina if 1-pinnatifid with (3) 10–30 lobes, pale green, glabrous or with scattered scales on the rachis and costae; lateral lobes lanceolate or narrowly triangular, 4–27 cm long, 1.5–5.5 cm wide, margins entire or undulate; terminal lobe commonly more elongate than lateral lobes; costae prominent but venation otherwise faint. Sori circular or elliptic, in 1 or sometimes 2 rows on each side of the costa. Fertile plants: throughout the year.

Distribution. Following Bostock and Spokes (1998b), this species occurs in Australia (W.A., N.T., Qld) and New Guinea and extends east to New Caledonia, Fiji and Pitcairn Island and may also extend westward to southern Asia and Africa (p.76).

Habitat. Commonly a species of the rainforest but also recorded as a component of a floating mat on the Daly River floodplain.

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Andrea Hope carried out the tedious task of producing the maps, for which we are very grateful, and Hilary Coulson and Dave Albrecht kindly, and quickly, forwarded specimens from Alice Springs when required.

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Any guide produced with the aim of enabling others to readily identify plants requires high quality, accurate illustrations. It is with pleasure that the authors thank Monika Osterkamp Madsen for providing them.

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Ferns and fern allies of the Northern Territory



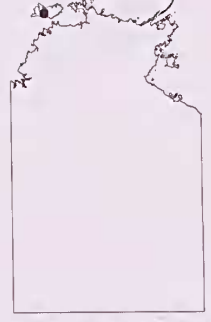
Acrostichum aureum



Acrostichum speciosum



Actinostachys digitata



Actinostachys wagneri



Adiantum atroviridae



Adiantum capillus-veneris



Adiantum diaphanum



Adiantum hispidulum
var. *hispidulum*



Adiantum philippense



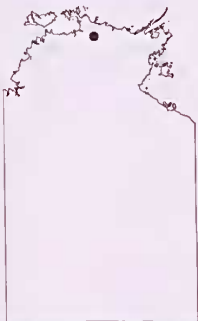
Ampelopteris prolifera



Angiopteris evecta



Asplenium (Litchfield entity)



Asplenium (Nabarlek entity)



Azolla pinnata



Blechnum indicum



Blechnum orientale



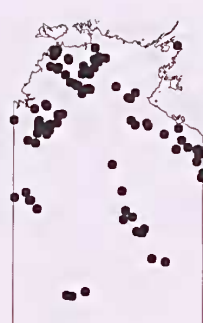
Bolbitis quoyana



Cephalomanes obscurum



Ceratopteris thalictroides



Cheilanthes brownii



Cheilanthes caudata



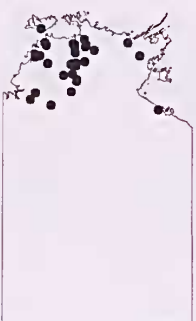
Cheilanthes contigua



Cheilanthes fragillima



Cheilanthes lasiophylla



Cheilanthes nitida



Cheilanthes nudiuscula



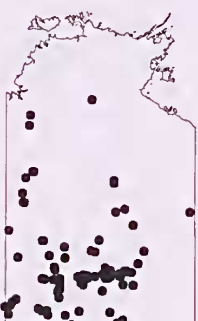
Cheilanthes praetermissa



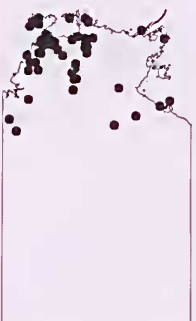
Cheilanthes pumilio



Cheilanthes sieberi
subsp. *pseudovellea*



Cheilanthes sieberi
subsp. *sieberi*



Cheilanthes tenuifolia



Christella dentata



Cyclosorus interruptus



Dicranopteris linearis
var. *linearis*



Doodia caudata



Doryopteris concolor



Drynaria quercifolia



Gleichenia dicarpa



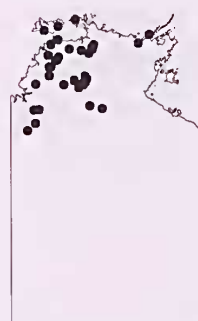
Gleichenia
(Victoria River entity)



Helminthostachys zeylanica



Histiopteris incisa



Isoetes coromandelina
subsp. *macrotuberculata*



Isoetes cristata



Isoetes muelleri



Lindsaea brachypoda



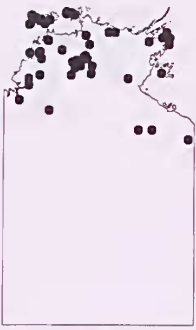
Lindsaea ensifolia



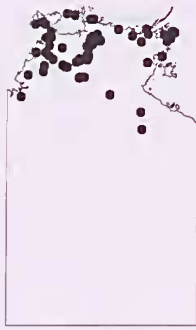
Lindsaea media



Lindsaea walkeri



Lycopodiella cernua



Lygodium flexuosum



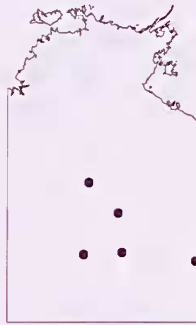
Lygodium microphyllum



Macrothelypteris torresiana



Marsilea angustifolia



Marsilea costulifera



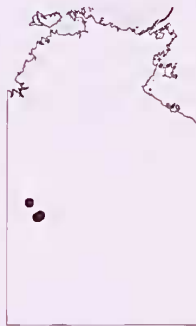
Marsilea crenata



Marsilea drummondii



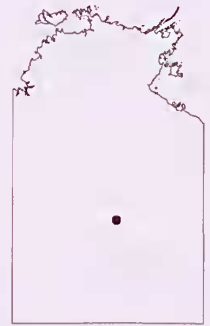
Marsilea hirsuta



Marsilea latzii



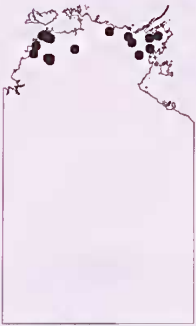
Marsilea mutica



Marsilea (Neutral Junction entity)



Microlepia speluncae



Microsorium grossum



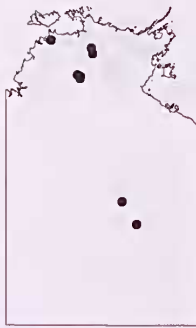
Nephrolepis acutifolia



Nephrolepis hirsutula



Ophioglossum costatum



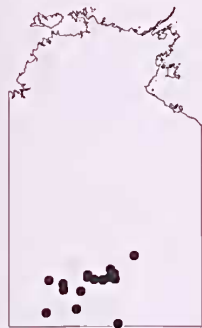
Ophioglossum granineum



Ophioglossum intermedium



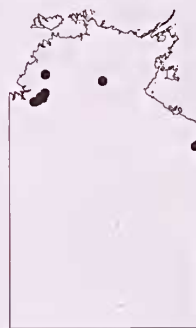
Ophioglossum lusitanicum



Ophioglossum polyphyllum



Ophioglossum reticulatum



Paraceterach muelleri



Paraceterach reynoldsii



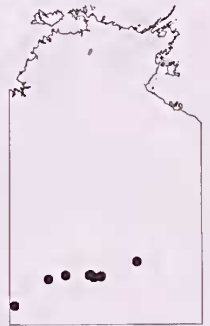
Pityrogramma calomelanos
var. *calomelanos*



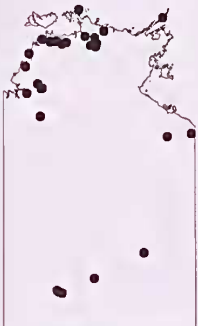
Platyzoma microphylla



Pleurosorus rutifolius



Pleurosorus subglandulosus



Psilotum nudum



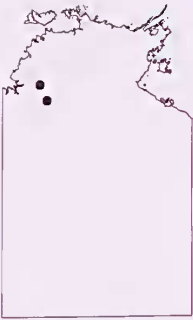
Pteridium revolutum



Pteris comans



Pteris tremula



Pteris vittata



Salvinia molesta



Schizaea dichotoma



Selaginella ciliaris



Selaginella pygmaea



Selaginella
(Mt Gilruth entity)



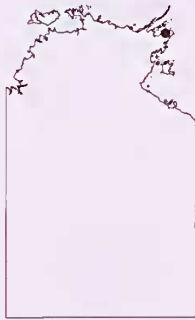
Sphaerostephanos
heterocarpus



Sphaerostephanos unitus
var. *unitus*



Stenochlaena palustris



Sticherus flabellatus
var. *compactus*



Taenitis blechnoides



Taenitis pinnata



Tectaria siifolia



Vittaria ensiformis

TAXONOMIC INDEX

Names in Roman are accepted names, those in italics are synonyms, misapplied and rejected names.

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